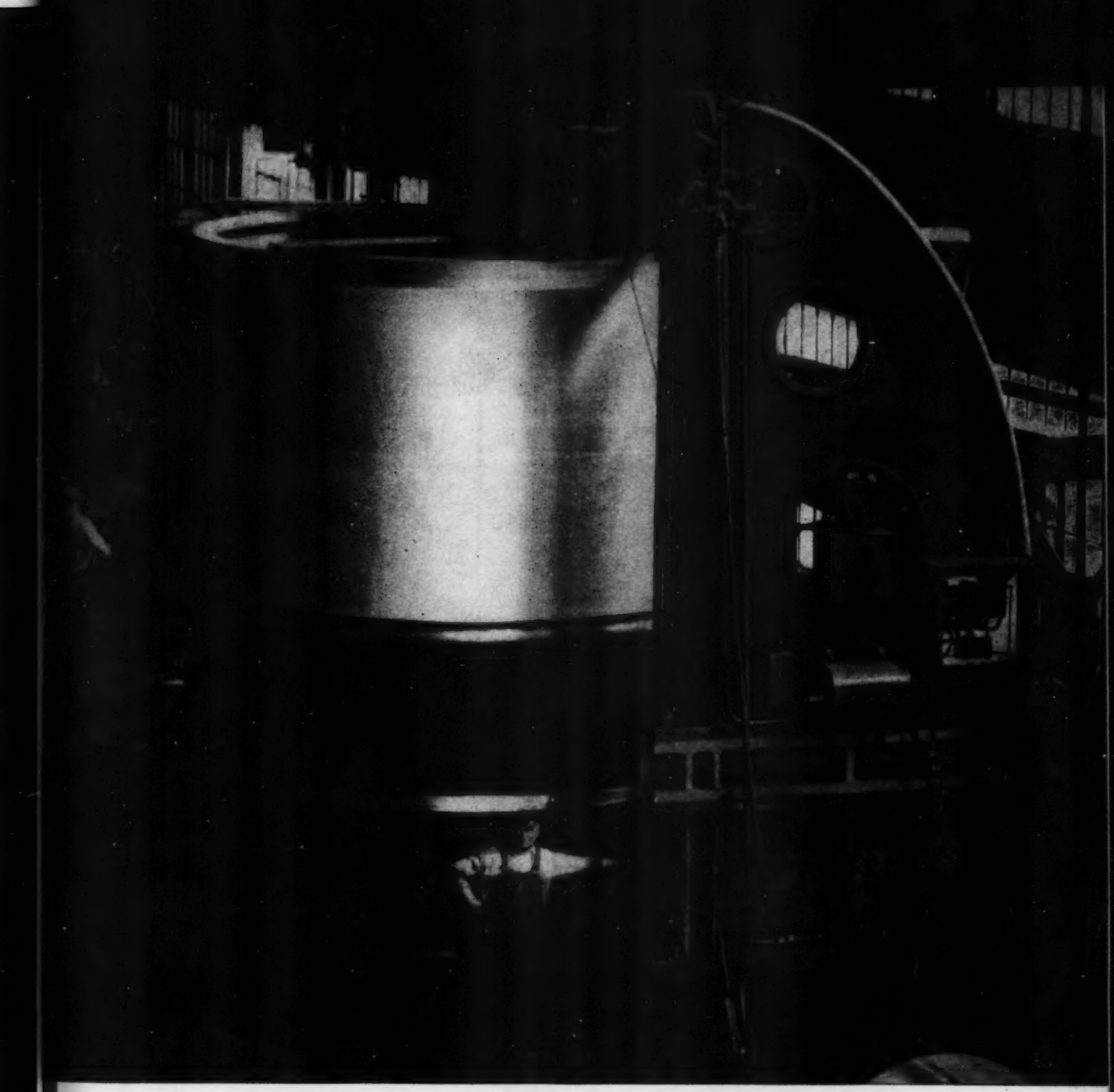

Yankee Dryer, cast and machined. Dimensions 144 x 198 inches. Weight 40 tons. Made of special Puseyjones alloy.

"ask us"

# THE PUSEY AND JONES CORPORATION

*Established 1848. Builders of Paper-making Machinery*

[NEWS-PRINT : BOOK PAPER : KRAFT : BOARD]

*Wilmington, Delaware, U.S.A.*

THE SIGN OF TRADE MARK SUPERIOR QUALITY

# THE PAPER INDUSTRY

MARCH, 1936
Vol. 17—No. 12

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry


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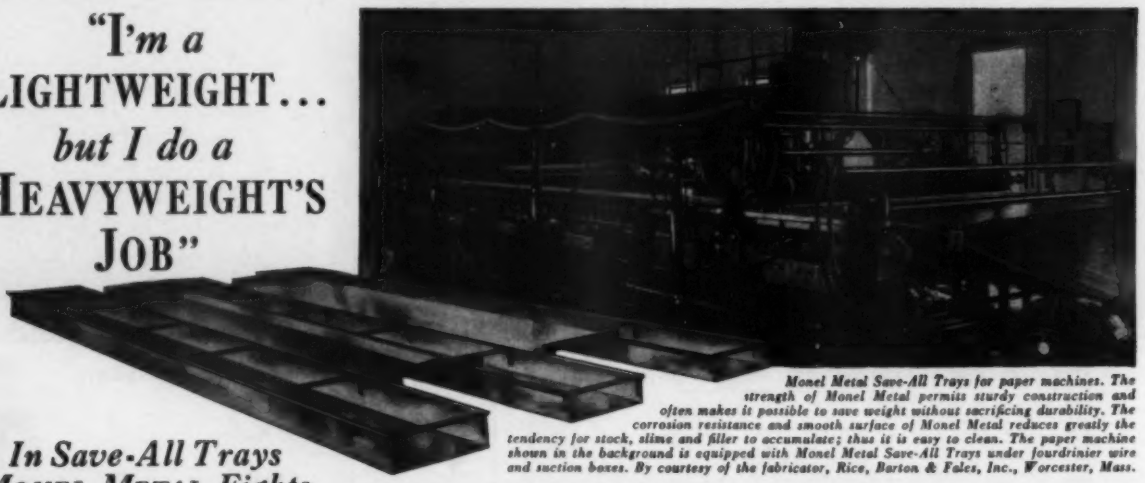
"I'm a LIGHTWEIGHT... but I do a HEAVYWEIGHT'S JOB"



*Monel Metal Save-All Trays for paper machines. The strength of Monel Metal permits sturdy construction and often makes it possible to save weight without sacrificing durability. The corrosion resistance and smooth surface of Monel Metal reduces greatly the tendency for stock, slime and filler to accumulate; thus it is easy to clean. The paper machine shown in the background is equipped with Monel Metal Save-All Trays under fourdrinier wire and suction boxes. By courtesy of the fabricator, Rice, Barton & Fales, Inc., Worcester, Mass.*

*In Save-All Trays MONEL METAL Fights Corrosion and Wins*

SAVE-ALL TRAYS need a combination of lightness in weight with strength and toughness. And, of course, a high resistance to corrosion by alkaline and sulphite white water.

It's a joy to the mill-owner who has his Save-All Trays made of Monel Metal, to watch year after year the way this sturdy metal stands off corrosion. Since Monel Metal is stronger than structural steel, trays can of course be lighter in weight than with other metals. Its extra strength is a big asset where the trays have to span a wide machine with little support. And the light weight makes it easier for workmen when they move it to change the wire.

We have prepared a bulletin which gives special attention to your problems, **"Monel Metal in Pulp and Paper Mills."** Send for it today; and ask us also for any of the following:

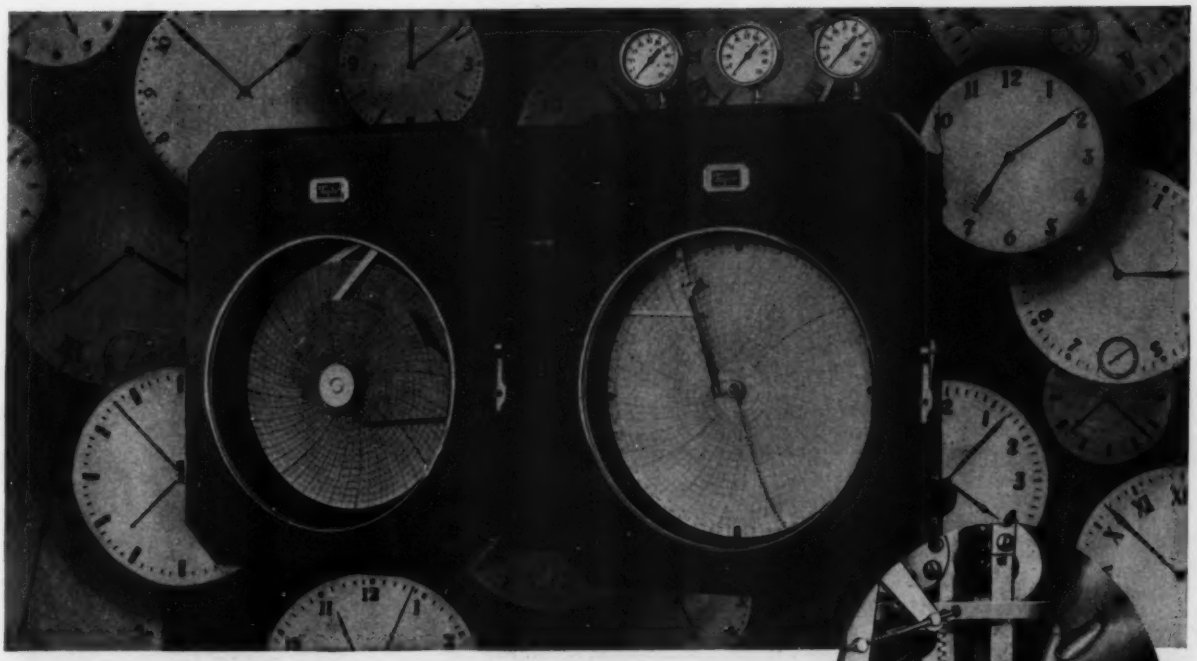
**"Engineering Properties of Monel Metal"**
**"Caustic Alkalies vs. Nickel and Nickel Alloys"**
**"Monel Metal in Pumps"**
**"Monel Metal Accessories"**

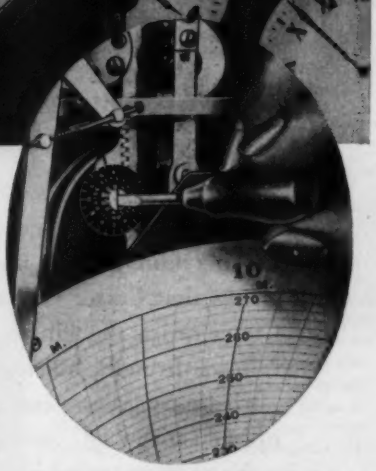
MONEL METAL

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET NEW YORK, N. Y.

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

# *Time harnessed by a CAM!*





*The Cam and the time-schedule mechanism of the Taylor Sulphite Digester Control are in the left-hand case. The Taylor Fulscope Recording Controller, which sees that each step in the cooking cycle is carried out at the time ordered by the Cam, is in the right hand case. A marvelous pair of operatives.*

## *Assure absolutely uniform cooking cycles by automatic regulation of your time-temperature and time-pressure schedule with the Taylor Sulphite Digester Control System*

YOU can be certain that the ideal cooking cycle for any particular grade of stock will be followed at any time. You can be sure of getting the maximum production of No. 1 stock at lowest possible conversion cost.

The Taylor System of Sulphite Digester Control does all this, and assures stock uniformity in color, freeness and strength. It gives a stock that felts, forms, and dries well. It reduces "tailing" losses. It cuts losses due to failure of digesters to blow cleanly.

This Taylor System controls and coordinates temperature and pressure exactly. In the steam flow control it even compensates automatically for variations in gas pressures.

The Cam (in the left hand case of the controller) is the absolute regulator of the cycle. It harnesses time. It directs the operations in the processing cycle. Any number of cooking schedules can be used simply by cutting new Cams to suit. And the cycle control is identical every time it is repeated. The Cam assures maximum and economical production.

The ease and certainty with which the Cam and the rest of the Taylor Control System regulate temperature and pressure in the sulphite process is being proved every day. Let us show you how you can use it in your mill.

Ask the Taylor Representative about this system—and others designed specially for paper mills. Or write Taylor Instrument Companies, Rochester, New York. Plant also in Toronto, Canada. Manufacturers in Great Britain—Short & Mason, Ltd., London, England.

**Taylor**

**Indicating Recording Controlling**

**TEMPERATURE, PRESSURE *and* FLOW INSTRUMENTS**

# GIVE YOUR

## *to Sink Their*

### Avoid metal-to-metal contact and have quieter gears

You can absolutely avoid metal-to-metal contact in your gears with Texaco Crater. Here are some of the other advantages you can enjoy:

1. Tremendous reductions in wear and noise. Lower power consumption due to the absence of metal-to-metal contact.
2. Stays "put" much longer—saving the labor cost of frequent applications.
3. Substantial reductions in the amount of lubricant required.

Applied hot, Crater coats gear teeth with a tough, wear-defying film that is both *adhesive* and *cohesive*. This means that Crater clings to gear teeth . . . it means that Crater resists the wiping action of gear teeth in mesh, and follows through, lubricating *every* gear in the train.

Ordinary greases can't compare. They channel, squeeze out and throw off...necessitating frequent replenishment.

Your gear trains howl for Crater. The Texaco representative will show you how to stop this howl.

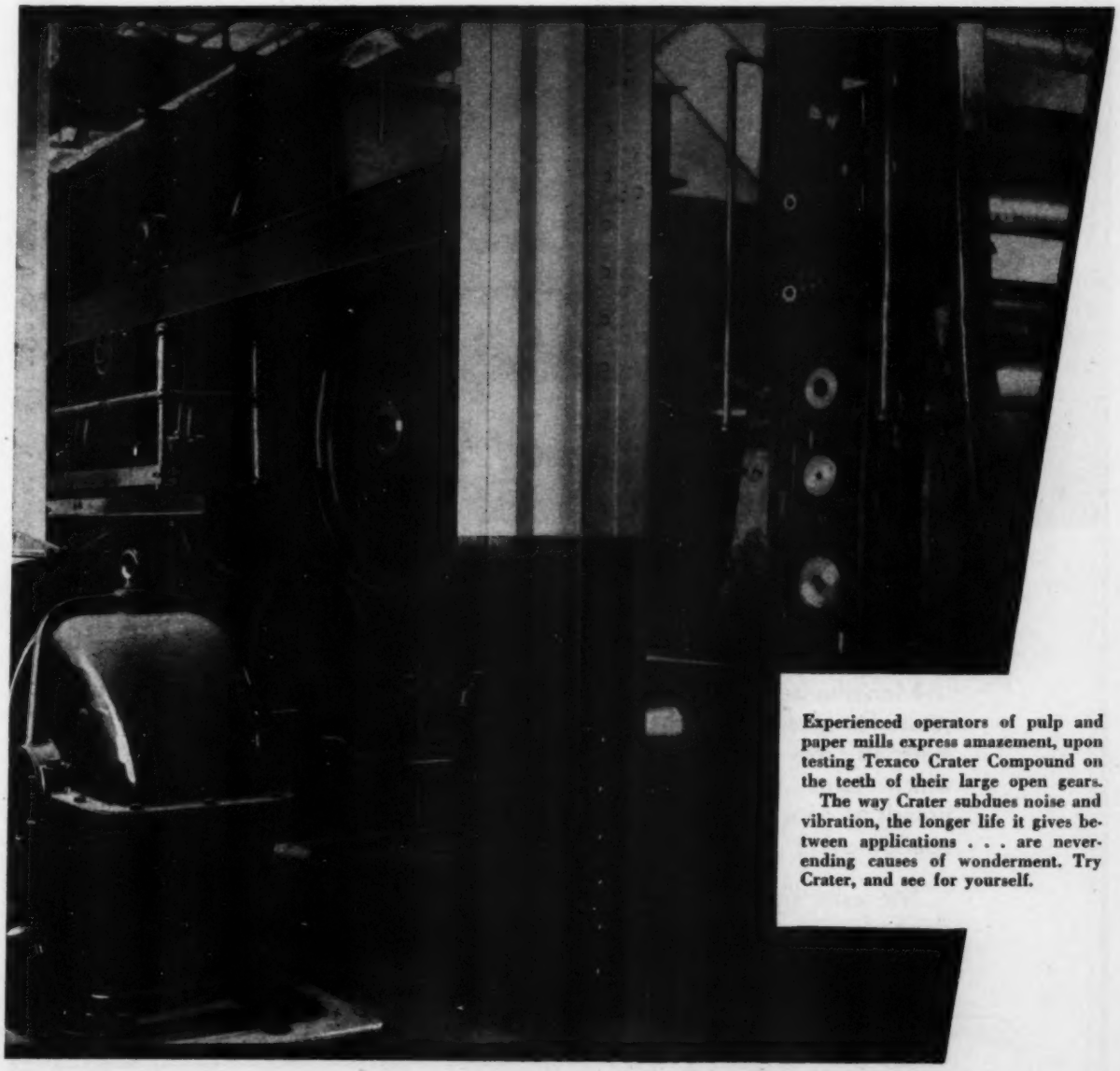
THE TEXAS COMPANY · 135 E. 42nd St., N. Y. C.

*Nation-wide distribution facilities assure prompt delivery*

TEXACO

# GEARS *something*

# *Teeth Into . . .*



Experienced operators of pulp and paper mills express amazement, upon testing Texaco Crater Compound on the teeth of their large open gears.

The way Crater subdues noise and vibration, the longer life it gives between applications . . . are never-ending causes of wonderment. Try Crater, and see for yourself.

# *Industrial Lubricants*

# "No Substitute for Quality!"

Menasha believes there is no substitute for quality. For quality in raw materials, for quality craftsmanship which turns those materials into brands of paper products famous the country over!

Menasha believes a quality finish depends on a quality start. The quality of every paper product which bears the mark of Menasha is carefully guarded from tree to finished product. Only through completely controlled manufacture can quality be complete.

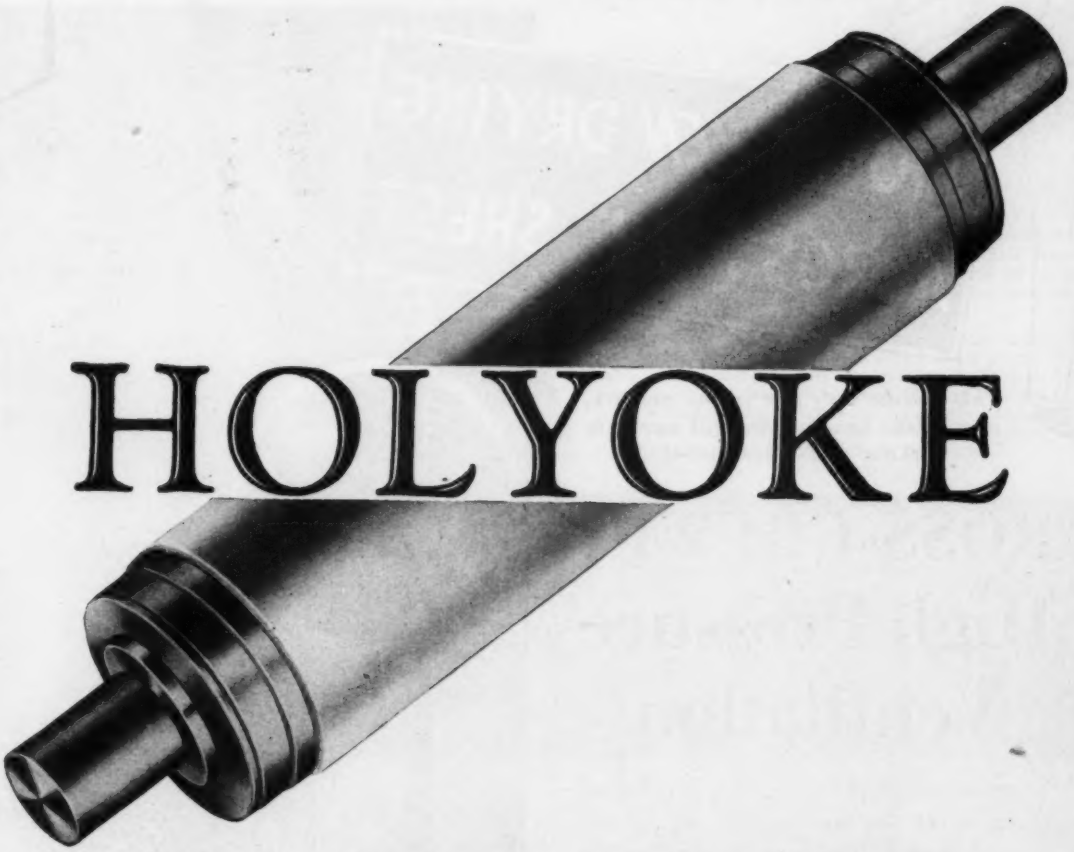
And through trying periods as well as prosperous, Menasha has pioneered and improved . . . always essaying to manufacture the finest paper products that its men and vast facilities can produce.

Menasha believes and builds with the thought . . . "there is no substitute for quality!"

**THE MENASHA PRODUCTS COMPANY**

**MENASHA** **WISCONSIN**

# LEADERSHIP



# HOLYOKE

**The longer life of the cotton and paper rolls built by the HOLYOKE MACHINE COMPANY is the natural result of seventy years manufacturing experience and knowledge of paper mill requirements. The outstanding HOLYOKE-Roll qualities of Resiliency, Uniformity, Long Life and Heat Resistance are all insured by rigid insistence upon the finer points of engineering construction.**

Write HOLYOKE MACHINE COMPANY, HOLYOKE, MASS., Manufacturers of Super Calenders, Platers, Cotton, and Paper Rolls, Washing and Beating Engines, Wood Pulp Grinders, Barkers, Chippers, Rag and Paper Dusters, Rag Cutters, Hydraulic Pumps and Presses, Hercules Water Wheels, Governors and special machinery to order.

## The HOLYOKE MACHINE COMPANY

FOUNDED 1863

# "here's one *Improvement* that will mean much to us!"

MORE *EVEN* DRYING ACROSS THE SHEET

***This will be only one of the positive, continuous benefits that will accrue to those mills that install***

## ROSS-GREWIN High Pressure Ventilation

**Without any interference with the normal operation of the machine, this Vapor Absorption method insures uniform drying and substantially increases drying capacity as well. Then there's an accompanying saving in the steam and power requirements. Add to these benefits the longer life it gives to the felts.**

**A week end shut-down is all the time required for installation.**

***Write for our Bulletin giving full description***

J. O. ROSS ENGINEERING CORPORATION

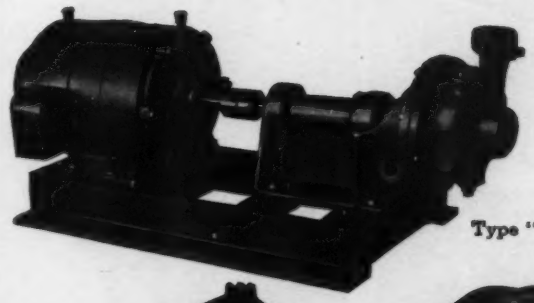
*Main Office* 50 MADISON AVE. NEW YORK, N. Y.

201 North Wells St. CHICAGO

1264 Griswold Ave. DETROIT

2360 N. W. Front Ave. PORTLAND, ORE.

# Hot or Cold Acids Pumped *Efficiently*



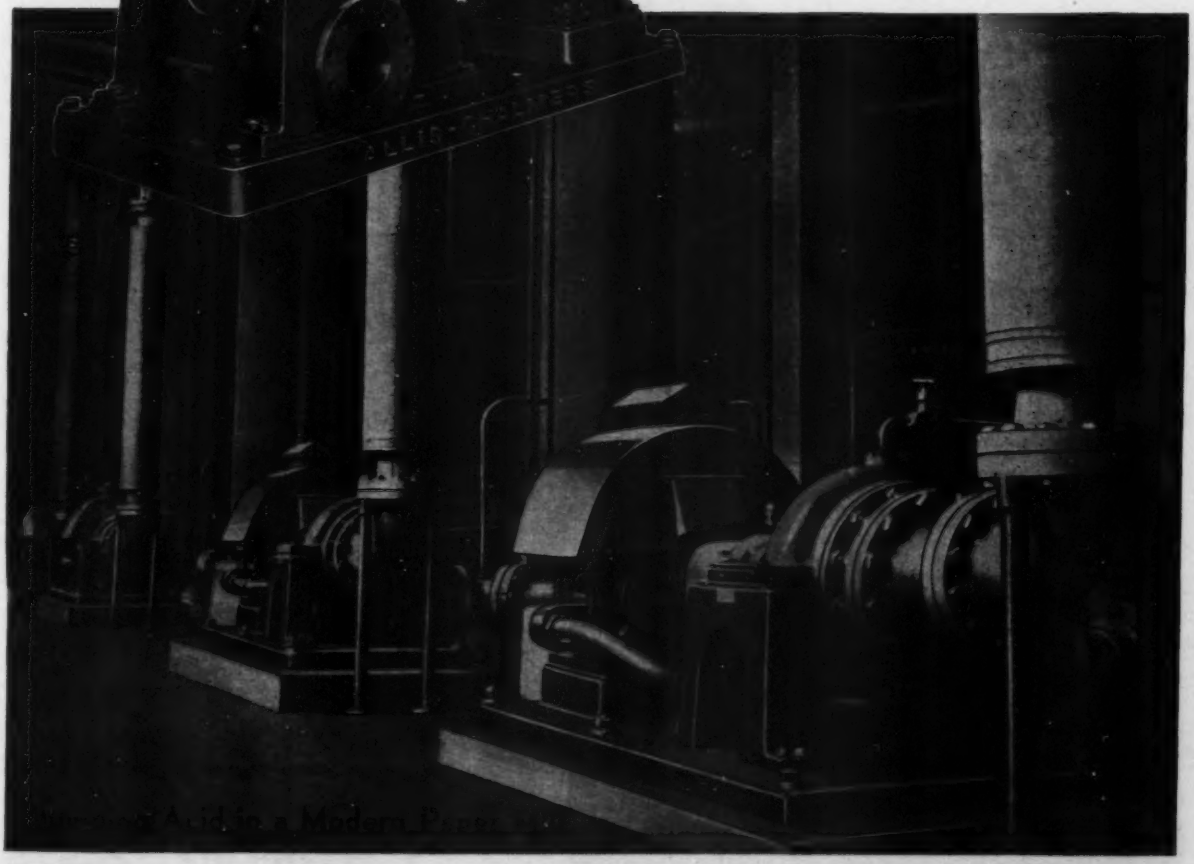
Type "SSB"

Type "SSA"

THESE pumps were designed to meet the demand for high grade units to handle acids in process work. They are of the single suction type and are made of Monel Metal or Chrome Steel.

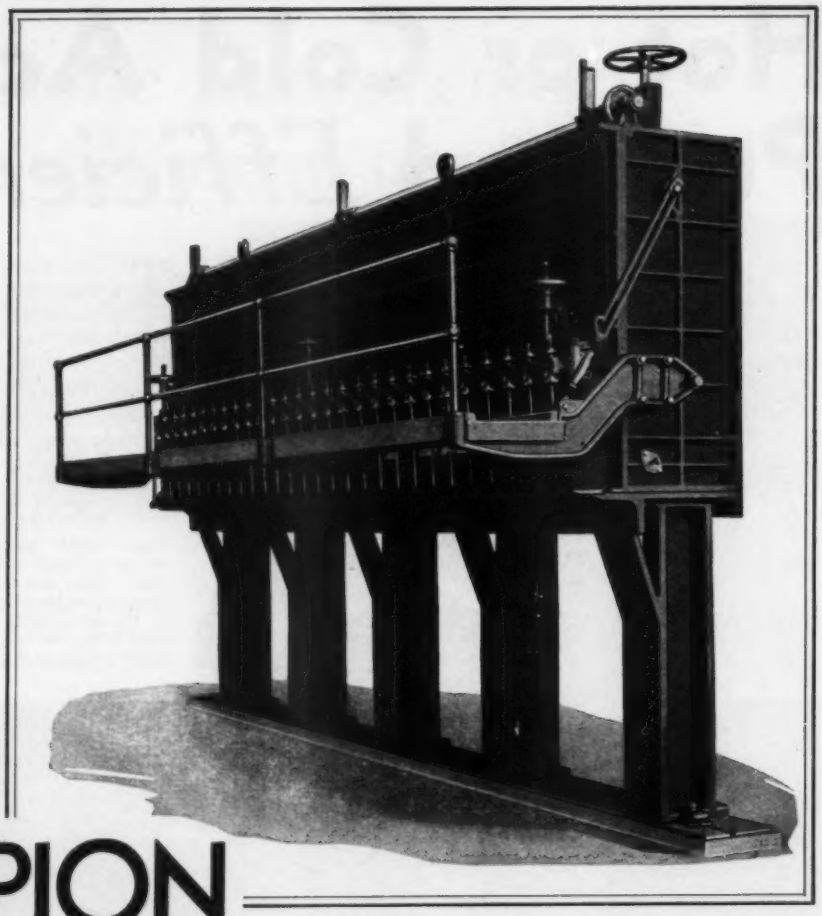
A number of type "SSA" pumps are in successful operation handling hot acids. These pumps were made of special Chrome steel. On account of the high temperatures the casing is supported on the horizontal center line by brackets and is also keyed on the vertical center line underneath the water cooled stuffing box.

Type "SSB" pumps are smaller but are built along the same high grade lines and of high grade materials. They are suitable for pumping liquids which cannot be handled by ordinary water pumps. Due to the simplicity of its design its cost has been kept very low. A large number of these pumps are in daily use in various processing industries.



# ALLIS-CHALMERS

— Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, U.S.A. —



# A TRUE CHAMPION

. . . a "championship" which has been built up on a long-time record of proven performance . . . a record among over one hundred fifty mills on almost every kind of paper . . . turning out better formation . . . higher uniformity . . . faster production . . . improved texture . . . less wear on wires . . . and in addition to it all . . . LOWER COST PER TON.

Any inlet inquiry, directed to the Valley Iron Works Company, will bring you desired information based on many years of successful inlet-building experience.

**VALLEY**
**Iron Works Company**

**Plant: Appleton, Wisconsin**
**New York Office: 350 Madison Ave.**
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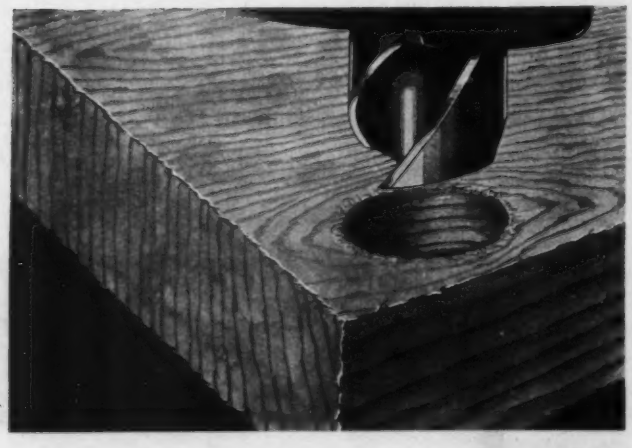
Beaters • Jordans • Stock Inlets • Roll Wrapping Machine • Pumps • Deckers
Screw Presses • Laboratory Equipment • Plug Valves • Flat and Rotary Screens
Automatic Felt Guide • Hypoid Gear Drive • Voith Kneader

# First Step: CLEAN WOOD

Large handicaps to cleanliness in pulp are erased in Weyerhaeuser Mills by the wood-cleaning-process. In these mills the huge logs are cut into thin cants revealing all knots and other sources of dirt. These cants are passed to cleaning tables equipped with effective knot-boring and cleaning devices. Rigid inspection is a double check on removal of all bark, knots, and other dirt sources. . . . Cleaned wood is the first step towards Weyerhaeuser clean pulp.

**PULP DIVISION · WEYERHAEUSER TIMBER CO.**
LONGVIEW, WASHINGTON



WEYERHAEUSER
SULPHITE
BLEACHED UNBLEACHED

# A COMPLETE LINE OF PAPER MAKERS' CHEMICALS

## GRASSELLI

Acetate of Lead
Aluminum Sulphate, Commercial, Iron Free
Aqua Ammonia
Barium Carbonate
Barium Chloride
Barium Sulphate (Blanc Fixe)
Bleach
Caustic Soda
C. P. Ammonium Hydroxide
C. P. Hydrochloric Acid
C. P. Nitric Acid
C. P. Sulphuric Acid
Muriatic Acid
Salt Cake
Silicate of Soda
Soda Ash
Sulphuric Acid
Tri-Sodium Phosphate

• Manufactured especially to meet the critical requirements of producers of high grade papers. Being always uniform in their chemical and physical properties, Grasselli Paper Makers' Chemicals have become the "buy-word" for paper mills where QUALITY is the watchword.
• Also, our Research Department is at your service . . . it may be of help in solving some of your problems. The service is available to you . . . just write, wire or 'phone any of our branches.

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# PAPER MACHINES

## *start* *stealing*

## AT THE AGE OF 15!

*The* CONSULTING ENGINEER *has a Part in the Picture*

We will gladly work with you and your Consulting Engineer, in building and modernizing straight, Edward & Harper type Fourdriniers; cylinder machines; wet machines; bindersboard machines and leatherboard machines.

IF YOUR paper machines are fifteen years or more old, they will soon begin to lose their full efficiency. Repairs will increase. And any competitors with up-to-date or modernized machines may start taking away your customers with speedier and finer work.

Why don't you call in one of Smith & Winchester's engineers to survey your mill? He'll suggest an economical method of rehabilitating your equipment and enlarging your profit.

Behind his advice lies long and varied experience, including designing and building the three largest Fourdriniers for fine tissue and condensor paper.

Write us, and an S & W Modernization Engineer will be assigned to help you.

"CARRYING THE TORCH"

S & W's contributions to paper making, and our facilities for still further improvements today. Write for this useful booklet.

★

# *The* SMITH & WINCHESTER

## *Manufacturing* *Company*



3913

PLANT AND OFFICES AT SOUTH WINDHAM, CONNECTICUT

# You will like these two pumps, because

*Buffalo Heavy-Duty Full Ball Bearing Paper Stock Pump*

*Buffalo Full Ball Bearing Liquor and General Service Pump*

**1** You'll lose no time cleaning out Buffalo Stock Pumps;—they DO NOT wedge or clog.

**2** You'll handle heavier consistencies easily—that's one of the characteristics of Buffalo Stock Pumps.

**3** You'll find the ball bearing construction the best you've seen—heavy enough to stand paper mill service.

**4** You'll have lower repair bills, because Buffalo Closed Impellers do not wear side-plates.

If you want additional reasons for the popularity of these two Buffalo Pumps, we shall be only too pleased to refer you to the operating engineers of mills where they are installed. You'll find that these men agree that for efficiency, economy and general satisfactory operation, Buffalo Paper Stock Pumps rate very well.

***Write us for quotations.***

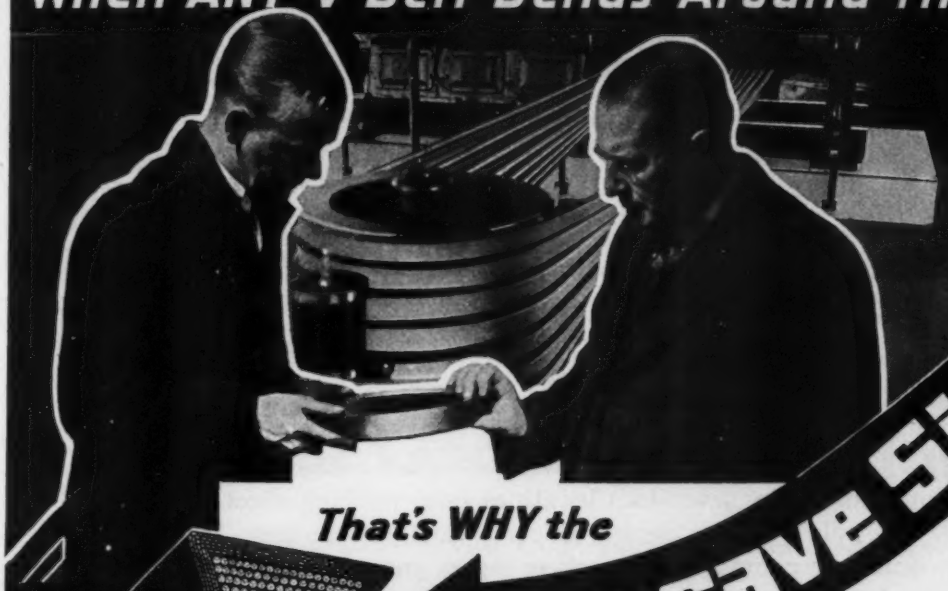
**BUFFALO PUMPS, Inc.**
**213 Mortimer Street, Buffalo, New York**
*In Canada:* CANADA PUMPS, Ltd., Kitchener, Ont.

"Buffalo"

**FULL BALL BEARING GENERAL SERVICE AND PAPER STOCK PUMPS**

# FEEL THAT Change IN SHAPE

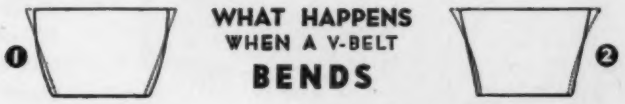
## When ANY V Belt Bends Around the Pulley



## That's WHY the Concave Side

### Cuts Transmission Costs

In bending, tension *narrows* the *top* of a V-belt while compression *widens* the *bottom*. This distorts a *straight sided* V-belt into a shape that does not fit the sheave groove—as shown in figure 1, below. Note the out-bulge of the sides.




The precisely engineered *concave* side of the Gates Vulco Rope exactly corrects this distortion—as shown in figure 2. There is *no* side bulge. This means *uniform* side-wall wear; *longer* life! Also, the full side-wall grip on the pulley prevents slippage on sudden load increases, and this saves *power* as well as belts!

The Gates Vulco Rope is the only V-belt built with the patented concave side.

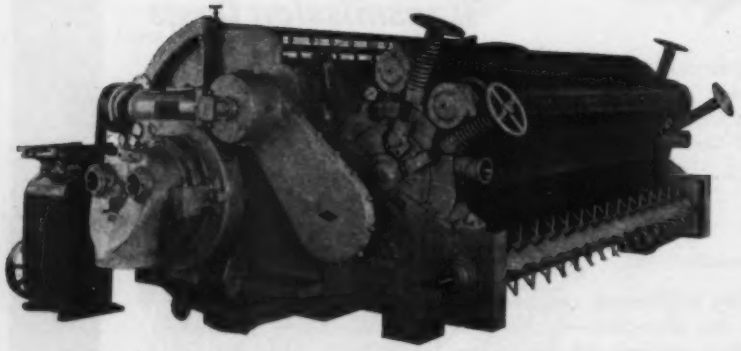
*Engineering Offices and Stocks in all Large Industrial Centers*

**THE GATES RUBBER CO.,** *Factory Branches*

Terminal Bldg. HOBOKEN, N. J.
1524 So. Western Ave. CHICAGO
747 Warehouse St. LOS ANGELES
2213 Griffin St. DALLAS
999 So. Broadway DENVER

# GATES VULCO ROPE DRIVES

"IMPCO" Rubber-Covered Acid Washer—with vacuum mould five-foot diameter by seven-foot length of face, washing showers, double-roll pulp removal device, micarta doctor, repulper. All parts coming in contact with stock or water are rubber-covered. Capacity 130 tons sulphate pulp.



"IMPCO" Rubber-Covered Acid Washer with auxiliary vacuum thickening cylinder and press rolls. 225 tons of Western sulphite is efficiently washed on the 5-foot by 10-foot Rubber-Covered Vacuum Mould, and the delivered sheet from this cylinder passing over the auxiliary thickening cylinder and under the press rolls delivering the stock at 18% to 22% as desired.

*Write for Detailed Description, Construction Features and Operating Data*

**IMPROVED**
**PAPER MACHINERY**
**CORPORATION**

**Nashua, New Hampshire**

# For the Good of the Industry

EVERY session of the annual convention of the American Paper and Pulp Association and its affiliated groups brings forth addresses and expressions from prominent men—men whose unselfish service has contributed much to the background of the entire paper industry. And those who speak, as well as those who listen, are there for one purpose—"for the good of industry."

If ever the right man, in the right place, said the right things, at the right time, in the right way, F. J. Sensenbrenner is that man. Ripe in paper experience, rich in economic wisdom, a statesman of the industry, and president of the American Paper and Pulp Association, he made several inspiring addresses before different bodies of the convention. In one of these addresses, he put before his audience a clear-cut diagnosis of the past, present and future of the paper industry without missing the essential facts or minimizing the price-cut evil, yet furnishing the formula for profit. Here are a few of his thoughts:

None of us is sorry that the past few years are past. They were not pleasant years; they were more than anything else a struggle for mere existence.

The Industry hovers, I believe, on the verge of a great forward movement. In fact, it made notable progress in 1935. . . . However, it was evident that the Industry had not fully realized upon its greater sales.

Many companies, even some large groups in the Industry, are still operating unprofitably. This is not wholesome.

How many of us realize our responsibilities in regard to prices? Nearly 150,000 workers and a large but unknown number of investors are dependent upon the efficiency of our selling forces and upon our individual selling policies.

We learned through bitter experience what happens when prices sink below cost levels. We have but to look back to 1932 to see the devastating effects of competitive warfare.

In the past two and one-half years, we have stopped the devastation of our resources.

The salesman, the attacking force of the Industry, meets the brunt of the competitive battle. He constantly faces pressure for lower prices, pressure to give concessions. . . . He, the salesman, must be strong indeed to hold his ground in the face of these pressures.

We must not forget that personal and industrial welfare are something more than distant relatives; they go hand-in-hand.

And, then, in this splendid final paragraph, breathing a faith and confidence in the future that should thrill every paper man, Mr. Sensenbrenner said:

"Ours is a growing Industry; for centuries it has been moving forward and upward. It is destined to continue on to new records of production, to new levels of service and to new standards of personal compensation. Of these, none stands alone. We profit when our industry profits; we progress as one body. We owe it to ourselves to give to our Industry our best effort every minute of every day."

The American Paper and Pulp Association re-elected Mr. Sensenbrenner its president—*for the good of the Industry.*

It takes *good* men to make a *good* Industry.

# + EDITORIAL +

## Papermaking and Research

HOW aptly the statement, "research is the mother of industry," applies to papermaking. It has been so for centuries. Even the very invention of paper by Tsai Lun is said to have been precipitated as a result of study. Then, down through the centuries are numerous references to other researches, each of them no doubt leaving its imprint upon the progressive development of the industry. If it were not for some of those researches, the industry probably would still be producing its paper by hand and operations in many other fields of endeavor would be equally backward.

It is doubtful if there is a paper mill executive who does not believe in research. There are some who believe in it so strongly that they are willing to invest necessary funds to promote research activities within their own organizations and to make many of the findings available to the industry as a whole. There are others who are prone to let George do it and to simply profit by such research knowledge as they are able to take unto themselves from the outside in time to allow them to profit therefrom. Maybe such individuals could be likened to parasitic plants which associate themselves with normal forms of plant growth and from which they obtain their food or some other advantage. In other words, they give nothing and take all—millstones on the necks of others.

E. V. Moncrieff has gone so far as to say that the ability to anticipate and meet industry's requirements is in direct ratio to the quality of a company's research work. No doubt with increasing competition in industry, research will be called upon to give certain advantages to the plant investing in it over those of competition. It stimulates the inner urge to keep ahead of the procession and cannot help but result in progress.

There is a certain kind of research, however, that does not fit so well into the workings of an average pulp and paper mill. It is research of a broader kind that is so necessary to industrial progress generally. Such research must be handled by agencies in position to divorce themselves from what might be called strictly plant research. Their work might be either purely fundamental, or applied, or both. In no way should it conflict but rather it should enhance the work that is being done by individual plant laboratories. The Forest Products Laboratory at Madison, Wis., is such a research establishment.

The research activities of the Forest Products Laboratory in general and of the Pulp and Paper Section in particular have been far-reaching. The pulp and paper industry of the world and perhaps your own mill have benefited from the findings and the published works of this organization.

To carry on this important work requires federal funds. The McSweeney-McNary Forest Research Act of 1928 authorized that the federal appropriation for "Forest Products Research" included in the Agricultural Appropriation Bill for 1937 be raised to $1,000,000. The current regular appropriation for Forest Products Research, according to information available, is practically the same as it was when the Forest Research Act was passed and $133,000 less than it was in 1932 at the height of the depression. The House Committee on Agricultural Appropriations recently has reported out the bill covering forest products research in the amount of $499,000 — an amount that is less than the current appropriation and over $100,000 less than recommended by the Bureau of the Budget. The House report now goes to the Senate Subcommittee for consideration and possibly for hearings. Unless the Senate sees fit to remedy this situation, the position of the Forest Products Laboratory will be even more unsatisfactory than at present.

To prevent such an occurrence and to encourage even increased research activities at the Laboratory, it is urged that every manufacturer of pulp and paper and all else who are interested in Forest Products Research appeal immediately to their senators at Washington to look into the situation and to make every effort to increase such appropriations to the $1,000,000 authorized in 1928.

## A Word of Appreciation

MORE than half-a-hundred papers covering an unusually wide range of subject matter were presented before the recent annual convention of T.A.P.P.I.

Facts revealed through their presentation came only as the result of much hard work on the part of actual contributors and others. All who had any part to play in their development and presentation are to be complimented for the willingness to give of their time and experience for the benefit of the entire papermaking fraternity.

Such effort cannot be commended too highly as it is a catalyzer of progressive thought and makes for advancement in the industry.

Read the report of the recent meeting in this issue of "The Paper Industry."

# · FELTS ·

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THIS IS AN ACTUAL UNRETOUCHED PHOTOGRAPH OF AN EXCELSIOR FELT

# The Coming Mud Storm

By WILLIAM SIBLEY

THE presidential campaign was launched last month amid a noisy and brilliant display of verbal pyrotechnics. Taking their cue from Washington perhaps, the freshmen and sophomores of one California college staged a mud-slinging battle; the difference being that the students were in fun, the politicians in dead earnest. From all indication, the nation, during the forthcoming summer, will be a 3,000-mile arena for a name-calling contest.

It is doubtful if ever before in American history has there been so much political discussion so long before the national conventions. Nor is this discussion confined to the politicians or to the press. It is everywhere; in Pullman smokers, taverns, restaurants, clubs, at home and on the street. Politics, in the form of the AAA, Dictatorship, Facism, Relief, Old-Age Pension, The Constitution, The Budget, Recovery, Boondoggling, Supreme Court, Bonus, Taxes, etc., etc., are so universally discussed as to make all other conversational topics alien. An approximation of this situation is not to be found short of a return to the days of Clay, Webster, and Beecher.

And this is altogether good. The wider the discussion and the broader the participation the better for both the national and political outcome. It is good to have people really think about their government. That indeed is the democratic theory of government. It is gratifying to see people in every walk of life take political issues out of Congress and decide the matters for themselves—in their own homes, stores, factories and street cars. Certainly that is a healthier condition than that of 1920—1924 and 1928 when people had to be prodded into even going to the polls—the prodding exercise even then being only about fifty per cent efficient.

Right now, of course, there is a real state of confusion. Issues are up, but their discussion is handicapped by the lack of chosen personalities. People don't yet know the stand of Borah, Knox, Talmadge, Landon, Smith, et al, on the issues closest to the individual's interest. But this state of confusion will be dispelled by the conventions—and then the fun will begin! Golly! How ominous look the gathering storm clouds! The next few months will be a period demanding clear heads and sound hearts. It will be a period of tense pulling—this way and that—the most powerful element used being that of emotion.

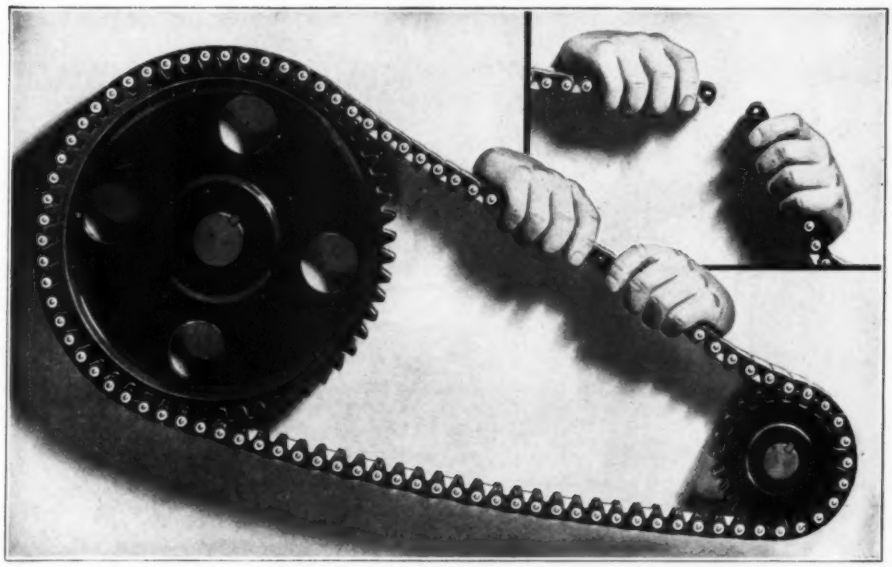
And emotion based largely on money. During the past three years the farmers, the laboring classes, the industrialists, the soldiers, the portrait painter, the dramatist, the musician, the younger generation, and several other classes all have tasted the flavor of easy government money. Millions are utterly dependent upon relief dole. Millions of gullible old people are being deluded by Dr. Townsend's cruel hoax. This presidential election will be fought out among the greatest aggregation of "gimme" people and hand-out askers in all history. Whether the majority will vote for their own particular brand of treasury check or whether they will right-about-face to again travel the straight highway, only November 4 will tell.

Whether or not the coming mud-slinging, acrimonious campaign will affect the even tenor of business depends largely upon the character of campaign promises and the character of the American business man. Ordinarily, a presidential campaign does not have as much effect on business as is commonly supposed. That statement is sustained by statistical fact. Excepting the uncontrollable depression year of 1932, presidential campaigns have had little effect on business—either way.

In 1880, business was 10 per cent below normal
In 1884, business was 15 per cent below normal
In 1888, business was 8 per cent above normal
In 1892, business was 10 per cent above normal
In 1896, business was 12 per cent below normal
In 1900, business was 5 per cent below normal
In 1904, business was 2 per cent below normal
In 1908, business was 3 per cent below normal
In 1912, business was 6 per cent above normal
In 1916, business was 15 per cent above normal
In 1920, business was 8 per cent below normal
In 1924, business was 18 per cent above normal
In 1928, business was 50 per cent above normal
In 1932 (deep-depression year)

Thus in fourteen presidential years it is seen that the election had little if any effect over business. During that time there were seven lean years and six fat years. While it must be admitted that this year is probably to prove an exception in the matter of campaign violence the actual commercial effect of that violence probably will not be great. As I remarked before, it is a year in which we will have need for clear heads and sound hearts.

# THE SILENT CHAIN DRIVE IS LOW IN FIRST COST



THE first cost of a silent chain drive, fully installed, is usually less than for flat or V-belt drive. And the most important cost, the total cost per year of efficient service, is always less—much less; as silent chain drives have operated 5, 10, 15, 20, 25 and even up to 33 years, with practically no attention or upkeep, except periodic replenishing of oil in the casing.

*Advantages over belts or endless ropes are:*

- —equal or lower first cost in many instances.
- —no dismantling of machine or removal of sheaves or pulleys to make repairs.
- —no "machine down" time with consequent loss of production as when renewing "endless" belts and ropes.
- —positive action assures full productive capacity of the machine . . . more pieces per hour.
- —easy to install . . . just connect the ends of the chain.
- —safety to employees . . . operates in oil-retaining casing.

Investigate the performance of the Link-Belt Silverstreak silent chain drive for use in connection with beaters, pumps, cutters, Yankee dryers, etc., before deciding on your next purchase of driving equipment. Match its low first-cost with any drive on the market today. After you study the facts, there should be no indecision regarding which drive will prove the best value for your needs. Drives carried in stock—½ to 60 h. p.—by distributors throughout the country. Larger Horse Powers supplied from the factory on short notice.

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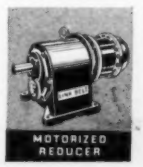

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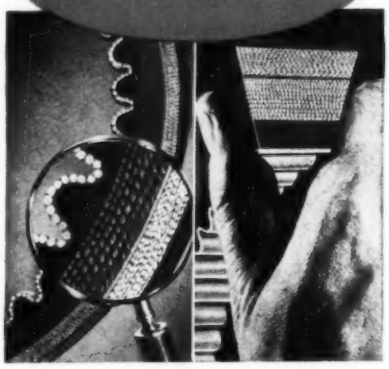
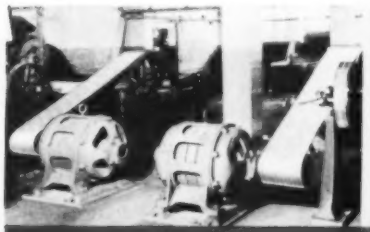
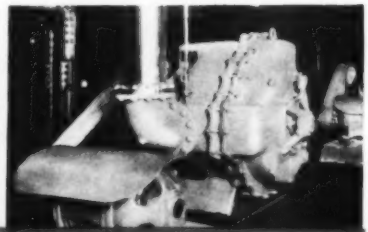


*Die-Cut Sides and Crosswise Rigidity Provide Greater Traction*





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Four Poles · Sleeve Bearings

Ball-bearing motor with solid covers over top openings, screen covers over lower portion.

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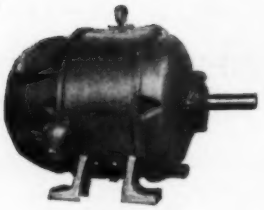
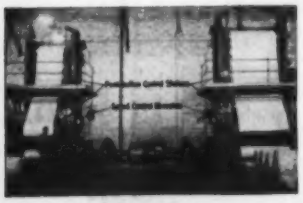


Enclosed water-tight motor with ball-bearings. Hand-holes permit ready access to brush rigging and commutator.

# *Born and raised* TO A HARD LIFE . .

You can wind snug, uniform rolls with Reliance Electric Drives for winders. Drive is direct; maintenance is less; space is saved.



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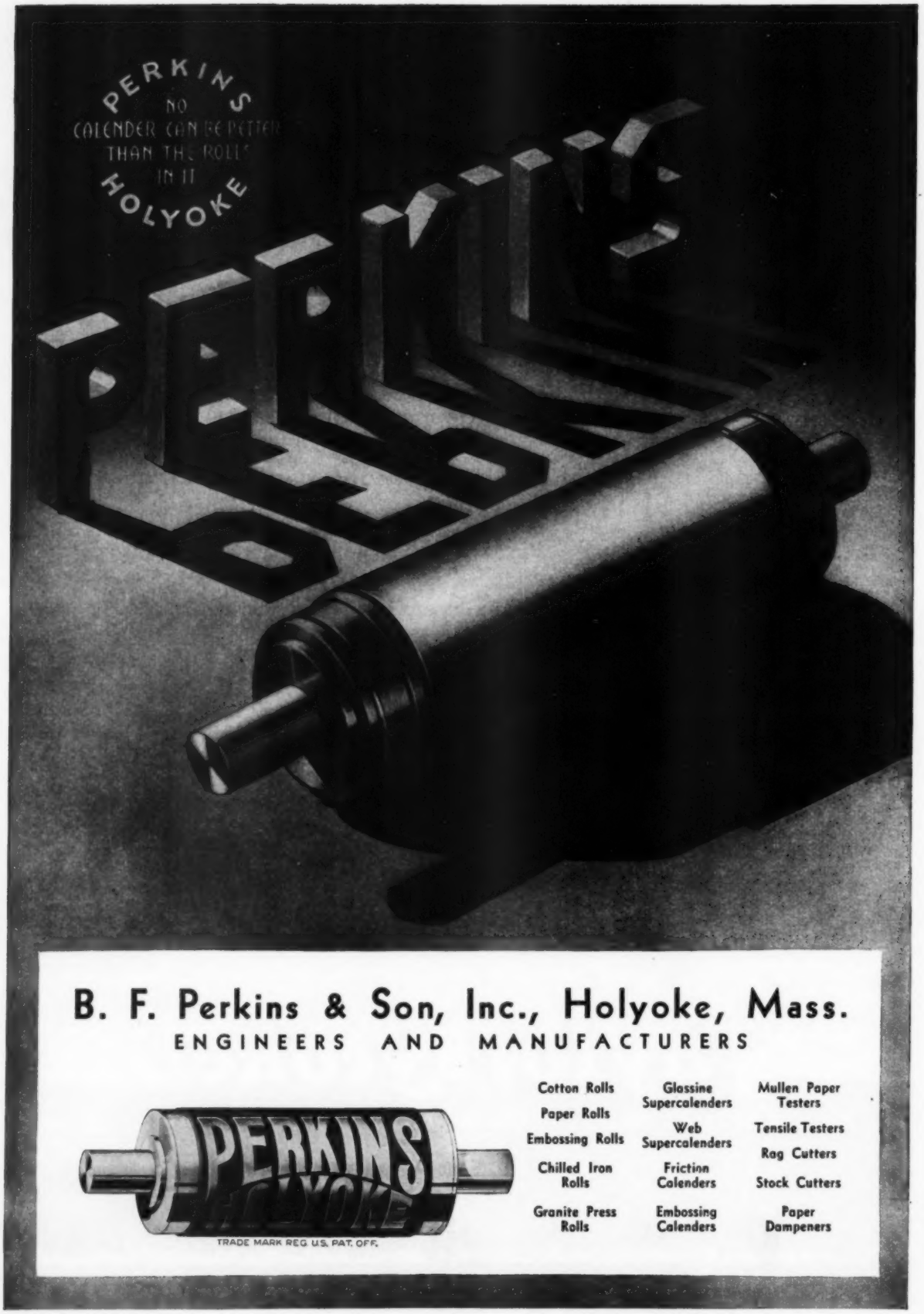


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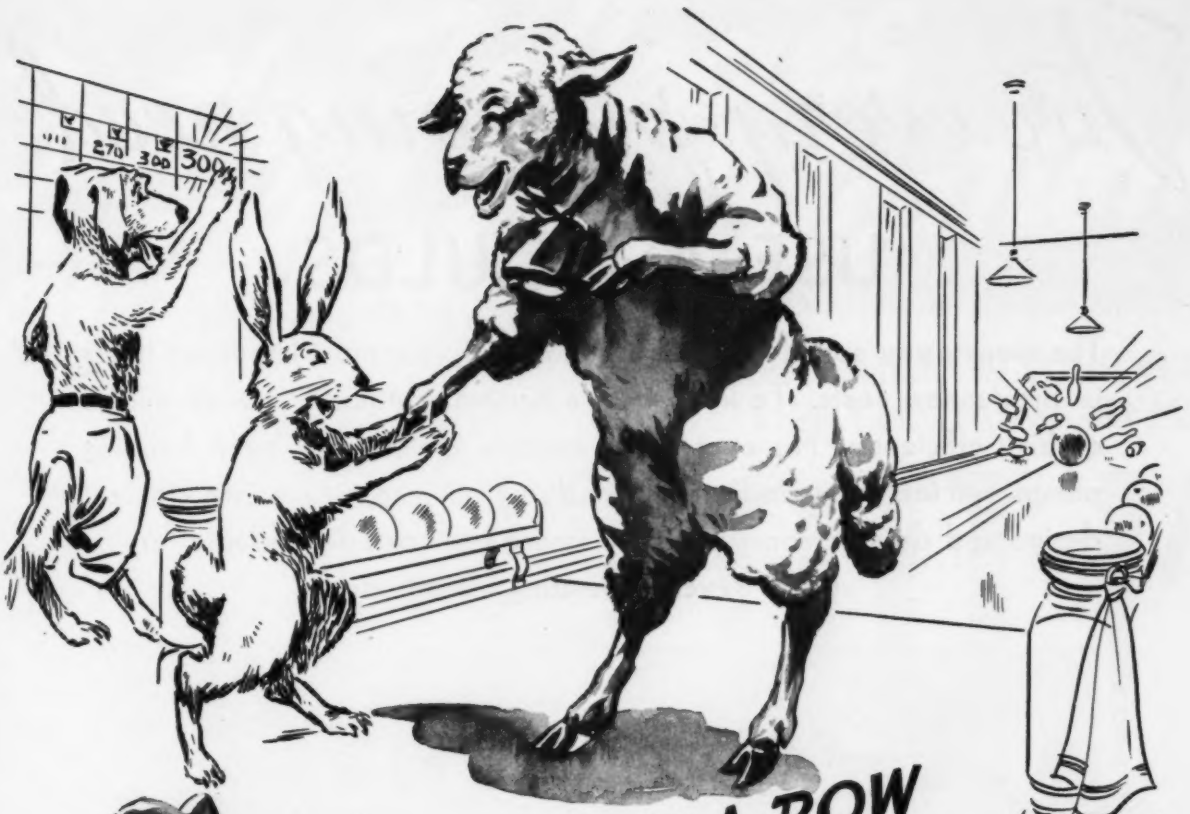


# "FOLKS - 12 IN A ROW FOR HAMILTON BELLWETHER"

And day in and day out Hamilton Felts have been producing better paper with lower felt expense, less down time. The reason lies in better wools; in more painstaking work in cleaning, weaving, fulling; in 10 operations and 22 inspections; it lies in our "recipe file" which gives the different combinations for each kind of felt. Most of all, it lies in the seventy-seven years of experience that is behind every Hamilton Felt. Try a Hamilton Felt next time; let your check sheets and time record tell you what felt to use from then on!

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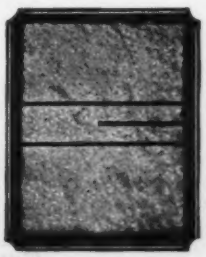


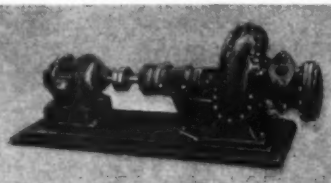
Hamilton Felts are marked by two blue lines full width of the felt and by one shorter blue line midway between them.

**Hamilton Felts**

# *For every pumping need*

## USE A GOULDS

**The money you spend for pumping is one of your most important items in production costs. To keep it at a minimum requires quality pumps of high efficiency. For over half a century Goulds has been building pumps for the paper industry, embodying our experience into efficient design and durable construction to assure low-cost, dependable service under severe operating conditions.**



For paper stock in consistencies up to 6%, Goulds Fig. 3105 is the finest Centrifugal Paper Stock Pump built today.

Goulds Agitator Pumps are manufactured in capacities from 2000 G. P. M. to 5000 G. P. M. for low head stock circulation, "slushing" and hydrating service.

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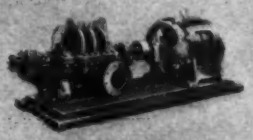
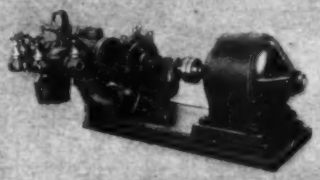
For general water supply, the handling of white water, black and green liquors, etc., Goulds Double Suction Centrifugal Pumps are available in capacities up to 15000 G. P. M.



Goulds Multi-Stage Centrifugal Pumps are widely used for spray, shower, general water supply and boiler feed service.



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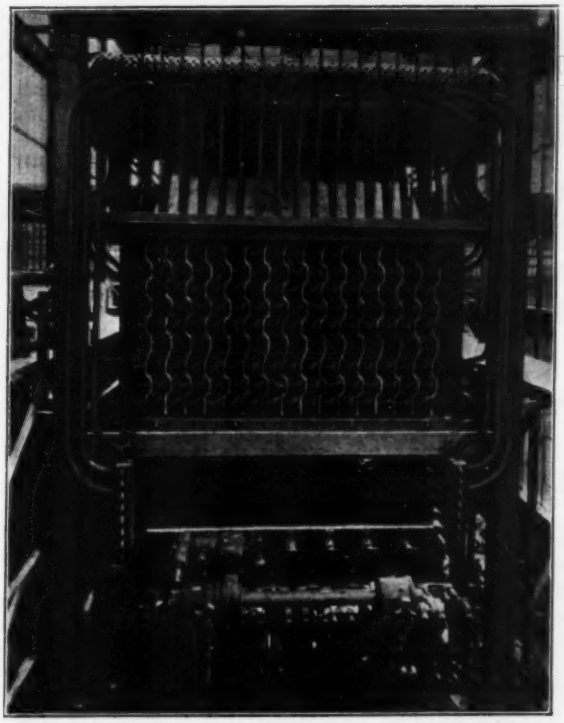

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We invite you also to consult with our experienced staff of engineers before selecting new steam generating equipment.

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Wausau Paper Mills, Brokaw, Wis.
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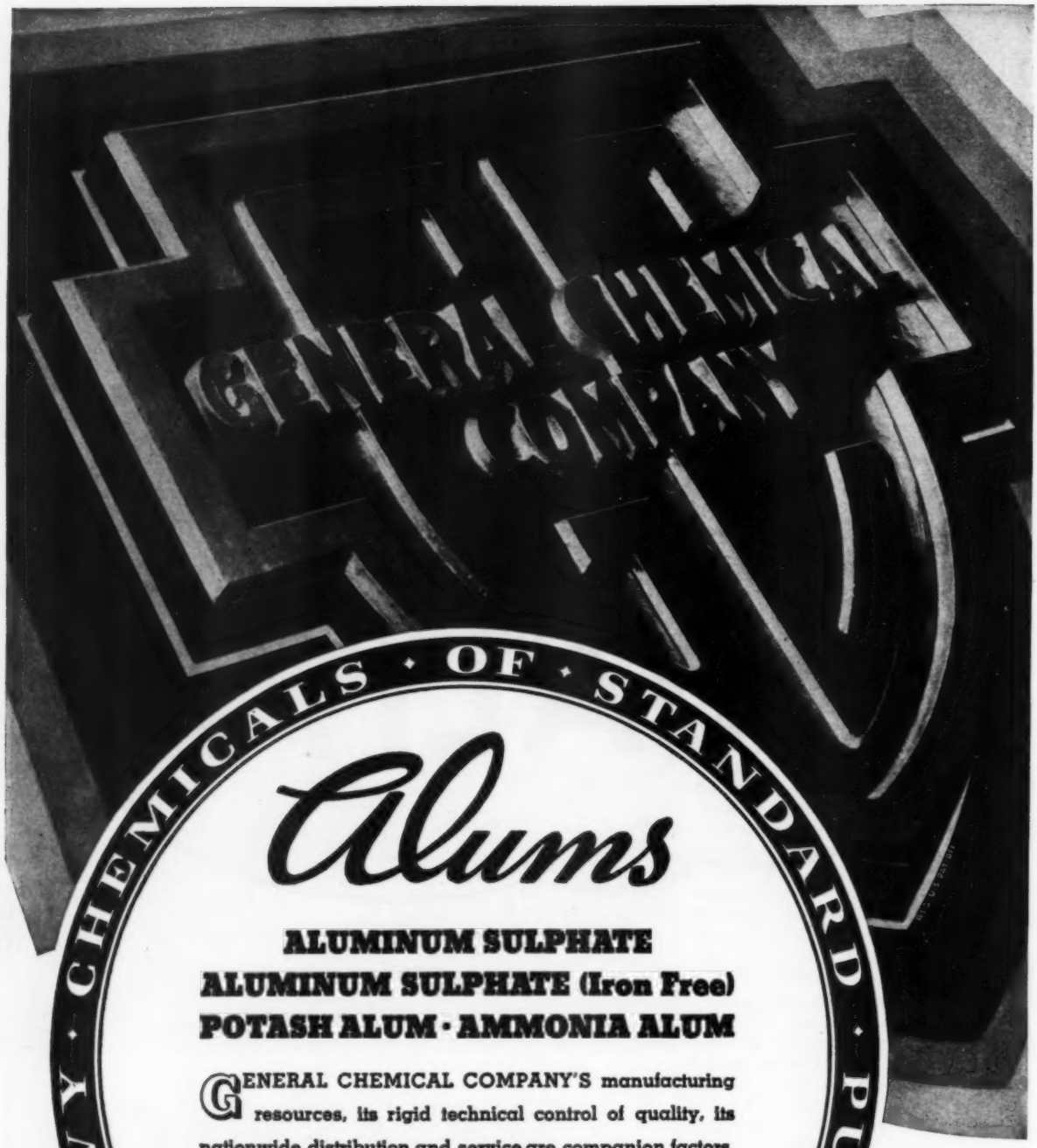


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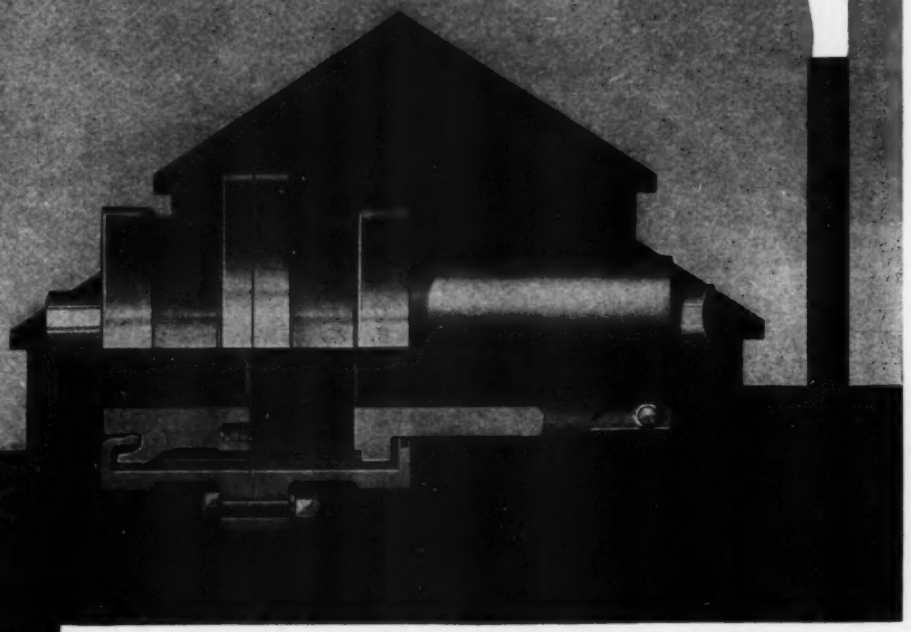

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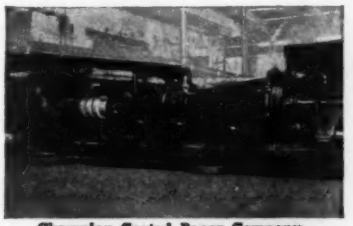

Champion Coated Paper Company
Hamilton, Ohio

## THE BARTLETT HAYWARD COMPANY

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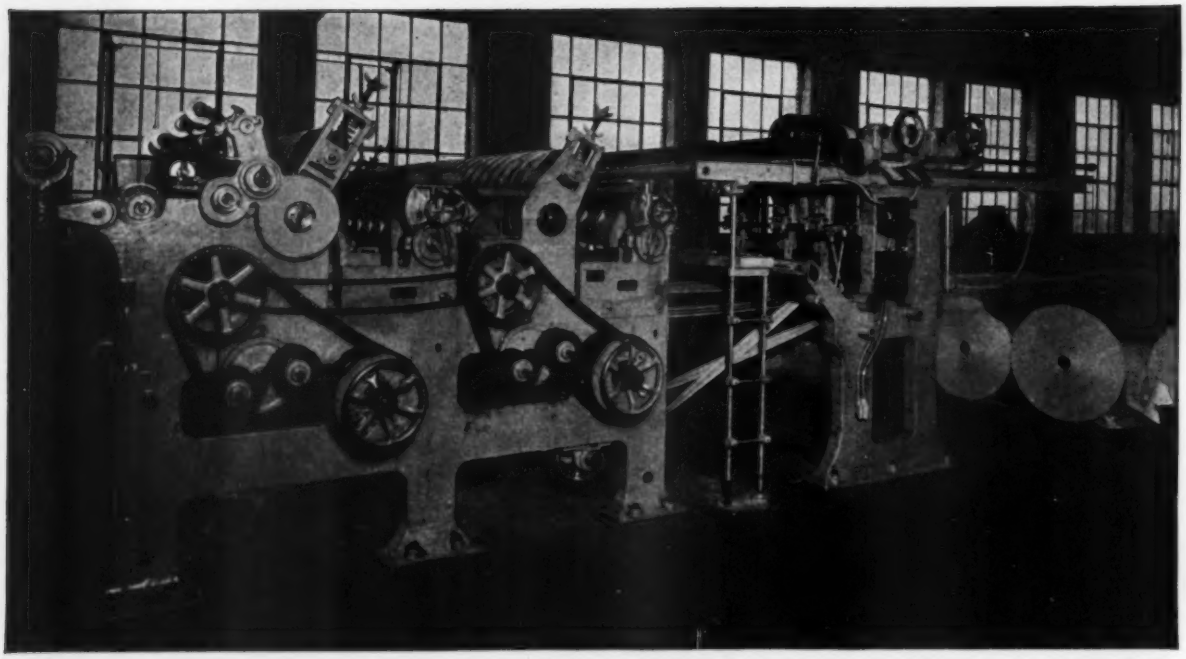

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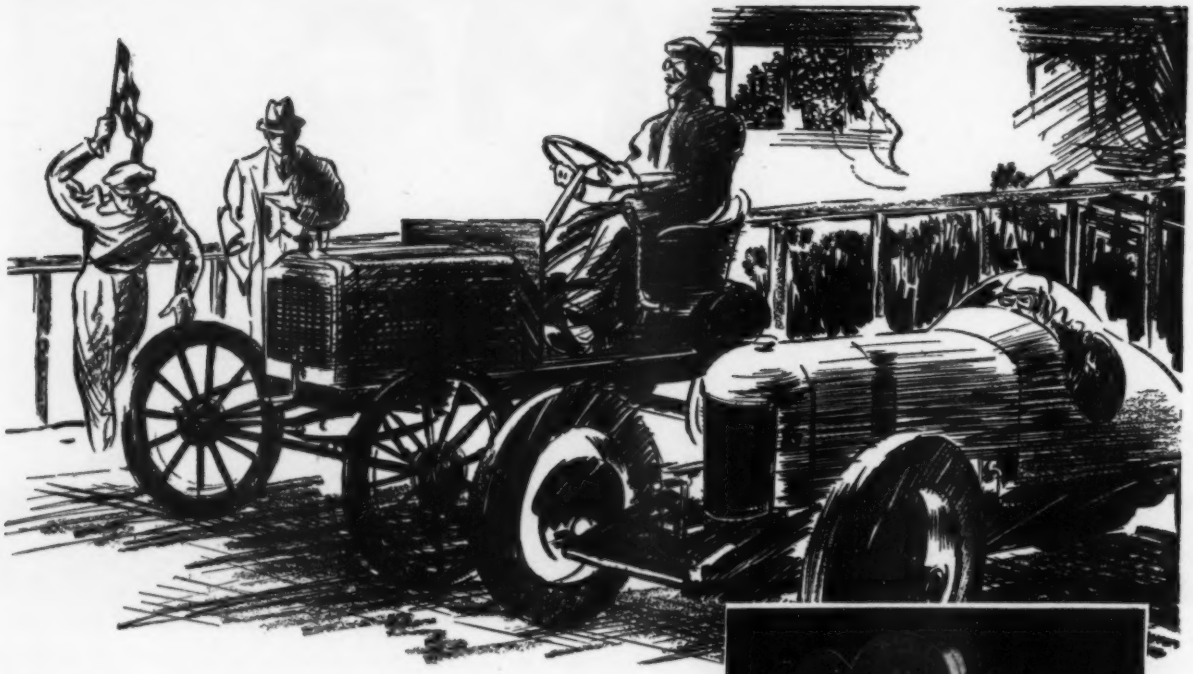

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SPECIAL SEAT AND DISC MATERIALS

FIG. 6003
SERIES 600 CAST STEEL GATE VALVE

CARBON AND ALLOY STEEL BODIES

MODERN IMPROVED DESIGNS

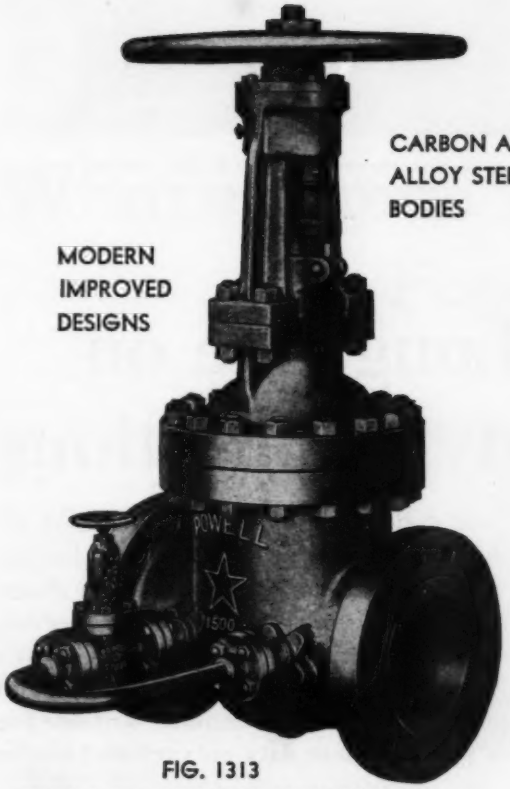


FIG. 1313
SERIES 1500 CAST STEEL GATE VALVE
WITH BY-PASS

Powell modern, improved-design Cast Steel Valves in Globe, Gate, Check or Non-Return patterns are intended for high pressure steam plants. They are available in a variety of materials adapted for valve bodies and seating materials—for all service conditions.

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## STEEL-SERVICE

THE PAPER INDUSTRY
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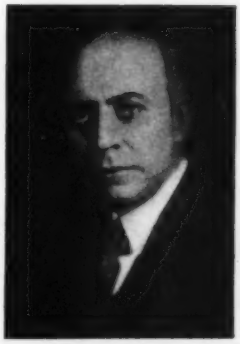
# What's Ahead for the Paper Industry in 1936

D. CLARK EVEREST*



DURING the annual meetings of the various divisions of the American Paper Trade Association, and at meetings of the National Paperboard Association held during February, there has been much discussion of this subject.

If one is to consider this question from the angle of "profit making," which I assume is the all important matter in the minds of management, I would say that "What's Ahead for the Paper Industry in 1936" is entirely in the hands of the manufacturers, converters and merchants.

During the past year there has been a constantly increasing demand in nearly every division of the paper industry. For several years we have heard expressions from various branches of the industry, "If we could only get an additional 15 per cent in volume there would be a strengthening of price structure."

Last year that volume increased, but unfortunately there was no firming of prices; on the contrary, there was a decline in prices. Competition, both in sales to converters and to merchants and the resale of converted articles and merchants' stocks was as fierce and as destructive as at any time during the lowest volume years of the depression.

This year, in my opinion, we are due for a still further increase in volume, and whether we make a reasonable profit in the industry is up to the people engaged in the industry.

The paper industry occupies a peculiar position. There is no pressure from other industries to supplant our products. Whatever competition we have is from within the industry; in fact, the paper industry occupies the unique position of furnishing the "substitute materials" for other industrial products. Therefore, I venture the opinion that profits in this industry are in the control of the manufacturing and distributing elements within the industry.

The capturing of these profits depends entirely on the common sense displayed in the handling of the business of the industry over the balance of the year.

Several important factors are ahead of us for at least eight months, and there is no question but that these

(*) Vice President and General Manager, Marathon Paper Mills Co., and a former president of the American Paper and Pulp Association.

will have a decided effect on demand for our products.

Ordinarily, an election year is "viewed with alarm" by many industries, but there is no reason for such reaction on our part this year. We are on the eve of one of the most bitter political campaigns in the history of this country.

Naturally, the radio will play an important part, but every speech of major importance must be reprinted for distribution. Newsprint consumption will be increased by at least 12 to 15 per cent due to the interest in the campaign and increased political advertising.

Every activity of both of the National Campaign Committees will call for an enormous use of paper products. Newsprint, book, writing, card index, wrapping, envelopes and other paper products will be in great demand.

The payment of the soldiers' bonus will also occasion increased use of paper. Every kind of advertising will be employed to catch the bonus dollar. Records required on approximately four million men will help the high grade writing and index business. In addition to paper required for advertising and records, in connection with the payment of the bonus, there is bound to be increased sale of consumers goods with the attendant use of wrapping, packing and shipping containers. This flurry due to bonus spending may be only a short-lived boom but we should be in position to take advantage of it. Eventually we shall be called upon to pay our portion of the bonus through the taxation route and if we do not get a fair return for such materials as we furnish, we will miss our opportunity to accumulate our part of what we must contribute later on to pay this debt.

Another important factor which will contribute to increased demand is the speculative buying which may occur in anticipation of "inflation." Perhaps no one knows exactly how inflation may come about, but there is in the minds of a great many people the idea that some form of inflation will result and they prefer to have commodities rather than excess cash balances.

There is already evidence of this on the part of large, well financed concerns which are desirous of placing long term contracts at present prices. In some cases actual buying and storing of paper and paper articles has commenced. Those of us who are engaged in manufacturing know of the constantly increasing costs of our raw materials. Some well organized industries already have recognized this trend and are strengthening their price structures. Unless we heed the trend we are going to be caught between the two millstones of increased cost and decreased or non-remunerative selling price.

Every effort will be made by the administration to keep business going until November elections, at least, and we should benefit by such activity.

Take the situation today in relation to pulp. I do not recall any time for several years when there was such a scarcity of spot lots. Kraft pulp of both first and second quality and bleached sulphite are decidedly firm and with a well controlled production program abroad will probably continue at present levels or advance, in view of present and probable increased demand.

Newsprint demand probably will increase about 12 per cent according to estimates of those familiar with the business.

Boxboard, including kraft and jute test liner; corrugating, etc.; as well as the folding box, corrugated and solid fiber box industry reached a point in 1935 which was second only to 1929. With the increased use of containers of every sort, it is reasonable to suppose that this industry will reach an all time peak during 1936.

Book and allied grades will see increased demand for reasons previously mentioned.

Writing of all grades will have an increased demand. High grade writings, particularly, are due for increased demand. The activity of S. E. C. in its approval of new financing will be of great help to this branch of the industry.

Wrapping, bags and packaging materials of all sorts are bound to follow the trend of general business which is unquestionably on the up-grade.

Glassine, greaseproof, parchment and waxed papers have shown steady improvement during the past year and I believe that 1936 will show considerable additional consumption. Intelligent surveys and study of new uses by those engaged in the manufacture of these lines have shown results and will continue to do so.

Tissues and allied converted products have shown constant increase in production and use. Failure to recognize necessity for price differentials on account of quality variance has probably been responsible for most of the difficulties of this branch of the industry. Recent developments point to a more intelligent handling of distribution and an improvement in the price situation.

Other grades of specialties, and particularly those in use for conversion into paper articles and for industrial uses, are bound to follow general business trends.

Analyze the whole situation and you will find that the chance for increased use of paper and paper products has not been as good in seven years, as it is today.

What we do about it in the matter of profits is up to us. Co-operation among producers and between producers and distributors is absolutely necessary if anything is to be accomplished. Quick action is necessary if we derive any benefit from a temporary surge in buying.

During the past seven years, new personnel has come into the industry, both in the producing and distributing end. Many of these people have only known this industry on a declining market.

Education along the line of advancing prices is necessary. Some seem to think that there must always be a constantly decreasing price. "How long can a dog run *into* the woods?"

I cannot recall any time when either converting or self-contained paper mills have ever made money for any length of time on a low-priced pulp market; neither can I recall any time when merchants or converters have consistently made money on a low priced paper market.

It seems to me, with the potential demand which is so evident, that we should get over the jitters; stop being fearful of shadows when we have facts to guide us; stop running into the woods. If we do this, and do it quickly, I am convinced that 1936 may be made a profitable one for the industry.

# The Theory of Pulp-Washers

## Part II—Practical Washers

**W. B. VanARSDEL, Research Department**
**Brown Company**

ACTUAL counter-current pulp washers provide a comparatively small liquor reservoir below each effect, and a pump which recirculates some of the liquor back into the same effect. Thus it is possible to regulate stock consistencies in each vat independently, and quite independent of the volume of wash-water supplied. There are several methods, however, for arranging the flow of liquor from an effect to the next stronger one. Two of these will be illustrated.

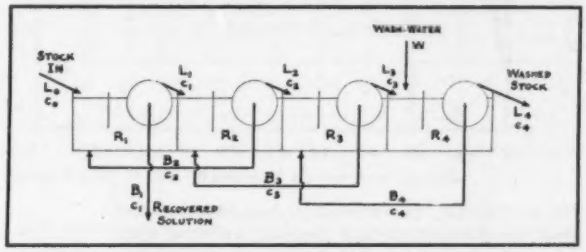



**Fig. 2—Four-effect ideal counter-current washer**

Figure 3 is a schematic diagram of a four-effect washer in which the counter-current flow is brought about by overflow of solution from one liquor reservoir to another.[11] Nomenclature is the same as in Figure 2, with the addition of the symbol R to represent the wetness of stock in the washer vats, and $c_s$, $c_t$, $c_u$ and $c_v$ to represent the concentration of solution overflowing from one reservoir to the next. That solution will be a mixture of white-water from the corresponding roll and of weaker solution overflowing from the next weaker reservoir. It will be assumed that in a perfect washer of this type there is no short-circulating of solution through these reservoirs, but that each is completely mixed at all times; and also that solution leaving any roll has the same concentration as that carried by the stock on that roll.

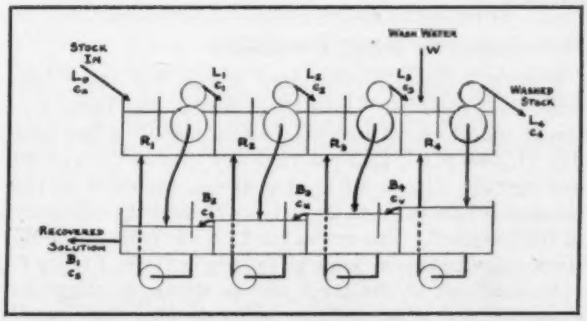



**Fig. 3—Four-effect reservoir-overflow washer**

From quantity balances:

$$B_1 = L_0 + W - L_4, \quad \ldots\ldots (33)$$
$$B_2 = L_1 + W - L_4, \quad \ldots\ldots (34)$$
$$B_3 = L_2 + W - L_4, \quad \ldots\ldots (35)$$
$$B_4 = L_3 + W - L_4, \quad \ldots\ldots (36)$$

From solute balances:

$$L_3c_3 = B_4c_v + L_4c_4, \quad \ldots\ldots (37)$$
$$L_2c_2 = B_3c_u + L_3c_3 - B_4c_v, \quad \ldots\ldots (38)$$
$$L_1c_1 = B_2c_t + L_2c_2 - B_3c_u, \quad \ldots\ldots (39)$$
$$L_0c_0 = B_1c_s + L_1c_1 - B_2c_t, \quad \ldots\ldots (40)$$

In the reservoirs:

$$c_v = c_4, \quad \ldots\ldots (41)$$

$$c_u = \frac{R_3c_3 - L_2c_2}{R_3 - L_2}, \quad \ldots\ldots (42)$$

$$c_t = \frac{R_2c_2 - L_1c_1}{R_2 - L_1}, \quad \ldots\ldots (43)$$

$$c_s = \frac{R_1c_1 - L_0c_0}{R_1 - L_0}, \quad \ldots\ldots (44)$$

Substitution of these values leads to equations which are too complicated and unwieldy to be of any use in calculation; it is simpler to follow through the washer a step at a time, starting with the weakest effect.

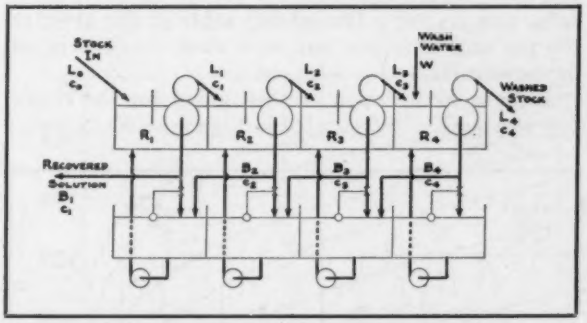



**Fig. 4—Four-effect washer, constant-level reservoirs**

The performance of this type of washer evidently depends upon the consistency of stock in the vat, as well as upon the couch-roll density. In Figure 6, two curves are given, for four effects such as just described; vat consistency is taken at about 2 per cent (R=50.0), and stock delivered by the couches either at about 9 per cent (L=10) or at 12.5 per cent (L=7). Both curves indicate distinctly poorer performance than the ideal four-effect washer would give, and the effect of raising the dryness of stock on the couches is evidently advantageous.

A washer of the reservoir-overflow type therefore represents a compromise; flexibility of operation has been attained, but at some sacrifice of effectiveness.

There is some ambiguity in speaking of the E.T.E. or "efficiency" of this type of washer. The actual

number of effects might be compared with the theoretical number of perfect effects of the ideal counter-current design, illustrated in Figure 2, in which case the failure to attain theoretical results would be partly attributable to the design of the washer and only partly to adsorption and imperfect mixing; for some purposes it might be preferable to compare instead with the theoretical number of perfect effects of this particular design. The complication of the general equation, however, makes a solution for the unknown fractional exponent a matter of great difficulty.

### Constant-Level Reservoir

Another type of practical washer [12] introduces a little more mechanical complication, but is arranged to approach more closely to the ideal counter-current conditions. It is illustrated in Figure 4. The solution-reservoirs are completely separated; white-water flowing from any cylinder is divided, part flowing to its own reservoir and the rest flowing to the next stronger reservoir, with a float-valve inserted in each white-water line as shown, to control the division. This may be called the "constant-level reservoir" type, where the preceding one was an "overflow" type.

Assume, as before, that each effect is 100 per cent efficient, and that complete mixing occurs in each reservoir. Then it is easily shown that the theoretical performance may be expressed by exactly the same equations (Nos. 26 to 29) as were found to apply to the ideal counter-current washer. In other words, flexibility of control has been attained by this design without any sacrifice of washing effectiveness. E.T.E., or "efficiency," may be calculated from an equation like (31). The upper curve in Figure 6 expresses the relation of $c_1/c_0$ to $c_4/c_0$ for a four-effect washer of this type, at 100 per cent efficiency, and with stock densities equal throughout ($L_0 = L_1 = L_2$, etc.).

A slight modification of this design for the liquor flow in a washer is illustrated in Figure 5. White-water

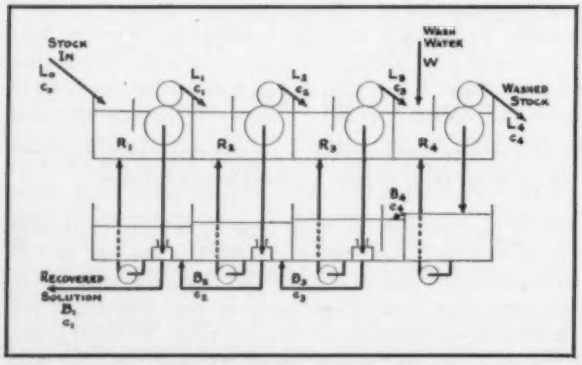



Fig. 5—Four-effect washer, submerged well type

from each cylinder flows into an open-ended well which is submerged in the corresponding reservoir; a by-pass pipe leads from this well to the next stronger reservoir. Then if there is a difference in the levels of the two reservoirs, solution will flow through the by-pass, and this solution will normally be undiluted white-water from the well. That is, when quantities are balanced in the system it will operate precisely like the design

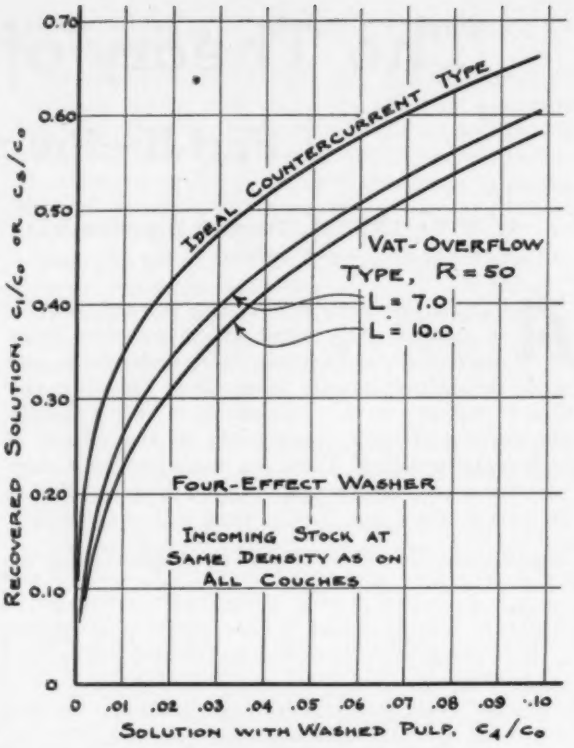



Fig. 6—Dilution vs. removal in four-effect washer. Ideal counter-current and reservoir-overflow types

of Figure 4, without the use of float-valves. Since there is no mixing of solutions in the last, or weak, reservoir, no well is necessary there, but simply an overflow to the next stronger reservoir. It should be noted that fluctuations in flow of stock to the washer will affect the system adversely; for instance, every change in rate of supply will change the equilibrium levels in the reservoirs, and if the change is a decrease, the readjustment will bring a temporary flow of dilute solution from the weak effects through the reservoirs and out with the strong recovered solution.

### Performance vs. Initial Consistency

Figure 7 gives performance curves for the "constant-level reservoir" four-effect washer, for three different conditions of incoming stock, namely 4 per cent dry ($L_0 = 24.0$), 12.5 per cent dry ($L_0 = 7$), and 20 per cent dry ($L_0 = 4.0$); in each case the stock on the couches is 12.5 per cent dry ($L = 7$), and the efficiency is 100 per cent. The curve for 12.5 per cent incoming stock therefore is the same as the top curve in Figure 6.

Comparison of the three curves shows, as might be expected, that what we have called the "performance" of the washer is very much better for a wet entering stock than for comparatively dry stock. Obviously, the proportional reduction of solute concentration in the washed stock would be little affected by the addition of more of the same original solution to the first effect: while the degree of dilution of the solution recovered from that effect would be almost inversely proportional to the quantity entering the effect.

In pulp-mill practice the stock may be discharged from a digester or chemical treating system at a fairly

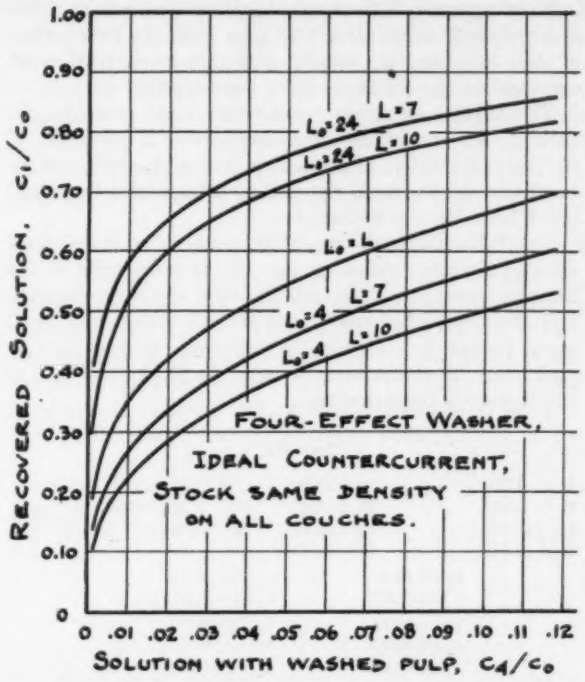



**Fig. 7—Dilution vs. removal in ideal four-effect washer. Influence of stock-density**

high consistency—say 10-12 per cent—and a portion of the strong recovered solution may be used to thin the stock to pumping consistency of 3 or 4 per cent, using for that purpose a stock tank provided with a mechanical agitator. To all intents and purposes, then, the stock tank becomes a part of the first washer vat, and the thick stock entering that tank may be assumed to set the values of $L_0$ and $c_0$.

Figure 7 also includes curves for the cases in which $L_0$ remains constant at 4.0 ( = 20 per cent stock), while stock on the couches is either 4.0, 7.0 (= 12.5 per cent stock) or 10.0 (= 9.1 per cent stock); and with $L_0$ constant at 24.0 (= 4 per cent stock) while L is 7.0, 10.0 or 24.0. As should be evident from the washer equation, all of the cases in which $L_0 = L$ give the identical curve. In all of the other cases, an increased density on the couches while the incoming stock remains unchanged results in improved performance of the washer.

The curves of Figure 7 are all special cases of the equations:

$$\frac{c_1}{c_0} = \frac{\left(\frac{W}{L}\right)^4 - 1}{\frac{B_1}{L_0}\left(\frac{W}{L}\right)^4 - 1}, \quad \text{.....(45a)}$$

$$\frac{c_4}{c_0} = \frac{\frac{W}{L} - 1}{\frac{B_1}{L_0}\left(\frac{W}{L}\right)^4 - 1}, \quad \text{.....(45b)}$$

It will be noticed that these equations take no account whatever of the stock densities in the vats, and that those densities are, therefore, immaterial. This seems at first thought entirely improbable, but the reason becomes evident enough upon reflection. On the other hand, the couch densities are all-important. Now it is a well-known fact that a high couch-density is easier to attain from a dense vat-suspension than from a dilute one, and the roll also has less water to dispose of. The obvious conclusion is that vat densities should be run as high as possible. Another effect comes into play, however, when this principle is pushed too far; as the stock is thickened up, mixing rapidly becomes less and less effective. At high densities the efficiency of the washer may drop so substantially as more than to offset the expected gain. The actual best operating point will depend largely upon the mechanical design of the machine.

### Performance vs. Number of Effects

The influence of the number of effects in a washer upon its performance is illustrated by Figure 8, which charts ingoing and outgoing concentration ratios for a perfect washer of from two to ten effects. The specific conditions chosen for this figure are $L_0 = 10$ (ingoing stock 9.1 per cent dry) and $L = 7$ (stock 12.5 per cent dry on each roll); then $B_1 = W + 3$.

The performance of the washer is improved, as might be expected, by adding to the number of effects, but as the number is increased, the addition of one more becomes less and less important. Under the conditions assumed in this problem it is interesting to note that if the concentration of solute is to be reduced to 1 per cent of the original value in the washed stock, at least five effects are required to deliver a recovered solution of 50 per cent of the original strength, and ten effects to deliver solution of 75 per cent of the original strength.

A chart of this kind indicates in a general way what

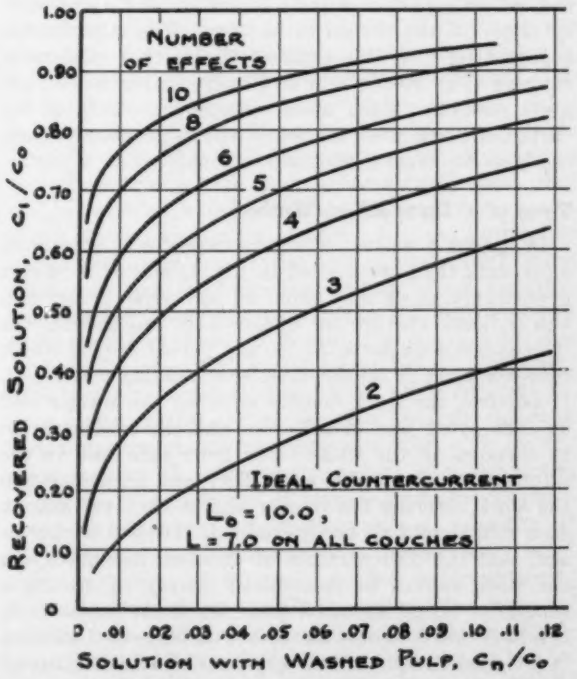



**Fig. 8—Dilution vs. removal in ideal counter-current washer. Influence of number of effects**

the effect of inefficiency in the washer may be. If ten actual effects give a performance equal to that of only eight perfect effects, either recovery of chemical or concentration of recovered solution will be lower than the expected value. It is often possible to balance the cost of lost chemical or of extra evaporation against the cost of additional washer effects, and decide on an optimum size for the layout.

### Preliminary Design of a Washer

Before the mechanical designer can start work on a new washer layout, certain fundamental data must be furnished to him. The preliminary calculations which will give him the necessary data are relatively simple. Certain facts will be given; for instance, the density of the stock to be washed and the concentration of solution accompanying it ($L_0$ and $c_0$), and the allowable dilution of the recovered solution ($c_r/c_0$). The type of thickener to be used approximately determines the stock density obtainable in each effect; the couching type will press stock to 10-15 per cent dry, the press-roll type may attain 18-20 per cent, a vacuum filter used as a thickener should deliver 20-25 per cent stock, and a screw-press may give 30-40 per cent stock. Choice of apparatus therefore sets L within certain limits. Now $c_r$, $c_n$, $B_1$ and W are all easily calculated. The required number of perfect effects may then be determined by solving the following equation for n:

$$\frac{c_0}{c_n} = \frac{\frac{B_1}{L_0}\left(\frac{W}{L}\right)^n - 1}{\frac{W}{L} - 1}, \quad \ldots\ldots\ldots\ldots\ldots\ldots (46)$$

How many actual effects will be needed to give the desired performance is then a question of the probable efficiency of the design to be used. The experiments reported later in this article indicate that efficiencies ranging from 90 per cent to 50 per cent, or below, are quite possible. Much more quantitative study of the variables which affect efficiency will be necessary before the basis for exact design will be laid.

### Tests of a Three-Effect Washer

In testing a washer, it is very desirable to determine more data than are needed in the equations, so that a preliminary check may show up any gross errors and also indicate whether the washer is in equilibrium, for the equations do not apply to any period during which concentrations or consistencies are changing materially. If possible, the stock density entering the washer and on each couch and in each vat, and the concentration of chemical in the white-water from each roll, in the diluting liquid entering each effect, and accompanying the stock entering the washer and in each vat and on each roll, should all be determined. It need hardly be said that the concentration of chemical accompanying the stock cannot be determined simply by testing a sample of liquid squeezed from the stock, particularly if adsorption is important, as it is in the case of alkalies. A weighed sample of the wet stock should be filtered, washed until the washings are free of the chemical, and the total quantity of chemical in the combined washings determined; if the washed mat of fiber is then dried and weighed, calculation will give both the percentage of dry fiber in the sample and the concentration of chemical in the solution which accompanied it.

The volume of fresh wash-water used must be accurately known, by direct measurement, if possible. If the rate at which dry stock is being washed can be carefully determined, the water volume can be calculated from the stock densities.

The following two tests were made on a three-effect counter-current washer in one of the pulp-mills of the Brown Company. The washer-rolls are wire-covered, and stock is picked up by couch-rolls under only moderate pressure. High-speed agitation is provided in each vat. The data were secured by R. A. Webber, of the Research Department.

**Test No. 1**

$L_0 = 5.70$ $B_1 = 24.98$ $R_1 = 93.8$
$L_1 = 8.05$ $B_2 = 27.33$ $R_2 = 79.6$
$L_2 = 10.08$ $B_3 = 29.36$ $R_3 = 81.7$
$L_3 = 10.94$ $W = 30.22$

$c_0 = 0.0425$ $c_0/c_2 = 30.35.$
$c_r = 0.00907$ $c_1/c_3 = 8.35$
$c_1 = 0.0117$ $c_2/c_3 = 3.45$
$c_2 = 0.00483$ $c_r/c_0 = 0.204$
$c_3 = 0.00140$ $c_3/c_0 = 0.033$

$B_1/L_0 = 4.380$
$B_2/L_1 = 3.390$
$B_3/L_2 = 2.910$
$W/L_3 = 2.760$

$1.76 \times 3.45 = (2.910)^c \times 2.760 - 1,$
$c = 0.881,$
$1.76 \times 8.35 = (3.390)^b \ (2.910)^{0.881} \times 2.760 - 1,$
$b = 0.614,$
$1.76 \times 30.35 = (4.380)^a \ (3.390)^{0.614} \ (2.910)^{0.881} \times 2.760 - 1,$
$a = 0.839$

The efficiency of No. 1 effect is 83.9 per cent, of No. 2 effect 61.4 per cent and of No. 3 effect 88.1 per cent. That of the whole washer is 78 per cent. The three actual effects are doing the work which 2.33 perfect effects would do.

In this case, the chemical is being recovered fairly completely (6.3 per cent loss), but the recovered solution is diluted down to only 20 per cent of the incoming strength. Vat consistencies are comparatively low (about 1.2 per cent) and couch densities moderately low (9-11 per cent).

**Test No. 2**

$L_0 = 4.60$ $B_1 = 12.85$ $R_1 = 67.5$
$L_1 = 6.96$ $B_2 = 19.5$ $R_2 = 83.0$
$L_2 = 7.30$ $B_3 = 15.55$ $R_3 = 55.0$
$L_3 = 6.45$ $W = 14.7$

$c_0 = 0.0447$ $c_0/c_3 = 14.2$
$c_r = 0.0144$ $c_1/c_3 = 5.55$
$c_1 = 0.0175$ $c_2/c_3 = 2.44$
$c_2 = 0.00767$ $c_r/c_0 = 0.323$
$c_3 = 0.00305$ $c_3/c_0 = 0.0703$

$B_1/L_0 = 2.793$
$B_2/L_1 = 2.800$
$B_3/L_2 = 2.127$
$W/L_3 = 2.280$

$1.280 \times 2.44 = (2.127)^c \times 2.280 - 1,$
$c = 0.783,$
$1.280 \times 5.55 = (2.800)^b \ (2.127)^{0.783} \times 2.280 - 1,$
$b = 0.657,$
$1.280 \times 14.2 = (2.793)^a \ (2.800)^{0.657} \ (2.127)^{0.783} \times 2.280 - 1,$
$a = 0.838.$

The efficiency of No. 1 effect is 83.8 per cent, of No. 2 effect 65.7 per cent and of No. 3 effect 78.3 per cent. That of the whole washer is 76 per cent, not quite so good as in the first test. Considerably less wash-water was used, vat consistencies and couch densities are both higher than in the first test; 9.8 per cent of the chemical was lost, but the recovered solution was stronger—32 per cent of the incoming strength.

### Author's Addendum

A further transformation of equations 31a-31d, which represent the counter-current washer efficiency formula, gives a general form which is more convenient for numerical solution, especially if attention is directed to only one or several of the effects in a long washer. In a four-effect washer, as considered in equations (31), the following relations hold:

$$\left(\frac{B_4}{L_3}\right)^d = \frac{\left(\frac{c_3}{c_4}\right)_{obs.}\left(\frac{W}{L_4}-1\right)+1}{\frac{W}{L_4}}, \quad \ldots\ldots\ldots\ldots (47a)$$

$$\left(\frac{B_3}{L_2}\right)^c = \frac{\left(\frac{c_2}{c_4}\right)_{obs.}\left(\frac{W}{L_4}-1\right)+1}{\left(\frac{c_3}{c_4}\right)_{obs.}\left(\frac{W}{L_4}-1\right)+1}, \quad \ldots\ldots\ldots\ldots (47b)$$

$$\left(\frac{B_2}{L_1}\right)^b = \frac{\left(\frac{c_1}{c_4}\right)_{obs.}\left(\frac{W}{L_4}-1\right)+1}{\left(\frac{c_2}{c_4}\right)_{obs.}\left(\frac{W}{L_4}-1\right)+1}, \quad \ldots\ldots\ldots\ldots (47c)$$

$$\left(\frac{B_1}{L_0}\right)^a = \frac{\left(\frac{c_0}{c_4}\right)_{obs.}\left(\frac{W}{L_4}-1\right)+1}{\left(\frac{c_1}{c_4}\right)_{obs.}\left(\frac{W}{L_4}-1\right)+1}, \quad \ldots\ldots\ldots\ldots (47d)$$

In general, if x is the E.T.E. of the p'th effect in a washer of n effects,

$$\left(\frac{B_p}{L_{p-1}}\right)^x = \frac{\left(\frac{c_{p-1}}{c_n}\right)_{obs.}\left(\frac{W}{L_n}-1\right)+1}{\left(\frac{c_p}{c_n}\right)_{obs.}\left(\frac{W}{L_n}-1\right)+1}, \quad \ldots\ldots\ldots\ldots (48)$$

A graphical chart for solution of equations (31) or (47) is quite easy to design, but its precision is poor unless it is drawn on a very large scale. Slide-rule computation is ordinarily superior.

G. A. Day has pointed out in a note to the author that although the last effect of a counter-current washer is actually identical in all respects to a simple washer-effect, its efficiency will appear to be different if figured in the two different ways; namely, by the simple-washer equation (8), or by the counter-current formulas (31a) or (47a). For instance, if the third effect in Test No. 1 is calculated by equation (8), the result is as follows:

$$3.45 = \left(\frac{81.7}{10.08}\right)^c, \quad c = 0.592$$

This compares with a value, c = 0.881, calculated by the counter-current formula. The reason for the difference appears to be that in the simple-washer formula fresh water equal to W is added to each of the hypothetical effects, while in the counter-current arrangement, fresh water is added only to the last effect. It is obvious, therefore, that we have in reality two different definitions of E.T.E., according to the type of washer under consideration. Whether a single definition can be made to fit both cases is a question which has not yet been answered.

### BIBLIOGRAPHY


(11) See U. S. Pat. No. 1,421,664, Brown et al; Canadian Pat. No. 204,755.

(12) See U. S. Pat. No. 1,683,782, Johnson; Canadian Pat. No. 269,072.


*Editor's Note*—The first installment of Mr. VanArsdel's article appeared in the January, 1936 issue of this magazine.

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## Indicators of Machine Operating Characteristics

EVERYONE connected with the paper industry probably remembers the story of two representatives of a well-known manufacturer of paper mill machinery who while driving past a small paper mill one day heard a tremendous squeaking in the machine room. They stopped and entered, found no machine tender in sight, but saw that the paper machine was running along all right, except for that strange squeak, which aroused their engineering instincts. They soon discovered the source of the squeak, seized an oil can, oiled the offending part and the noise stopped. Almost immediately a workman appeared on the scene, asking what was wrong. The squeak was a signal to him that the machine was running properly! Of course, such a situation probably wouldn't exist today, but the fact remains that in operating many types of machinery the attendant listens to it much more than he watches it. Every machine has its characteristic sounds. The rhythmic "clack-shush" of a Corliss engine's valve gear and the faint rumble of the main bearings tell the engineer that all is well; a steam turbine or motor or centrifugal pump each has its characteristic note. Let the operator's trained ear detect the least variation in that note and he is alert at once. But the human ear varies and sometimes fails, with modern high speed machinery, to detect important factors. As an improvement on the listening rods and other devices that machine operators often use to assist their ears, some new devices for supervising the operation of equipment have been recently developed. They are being installed in a large central station to give accurate information about certain turbine characteristics. The equipment consists of: eccentricity meters to indicate and record shaft eccentricity of turbine spindles; vibrometers to indicate and record the range of vibration at main bearings; expansion meter to indicate and record axial expansion of turbine cylinder; noise meter to indicate, through an amplifier system, the noise of blading and glands. While this use of the meters is quite specialized, it seems likely that the principles involved in these devices will eventually be applied to other types of machinery.

# Rayon Pulp from Southern Pine

**ROYAL H. RASCH, Research Chemist**
**Pulp and Paper Laboratory of the Industrial Committee of Savannah, Inc.**

THE Pulp and Paper Laboratory of the Industrial Committee of Savannah, Inc., was founded and exists for the purpose of research on a semi-commercial scale on the suitability of Southern pine for all forms of wood pulp and products therefrom, to the end that pulp and paper mills might be established in the South.

While the program of the Laboratory was confined initially to the study of newsprint, its founder and director, Dr. Chas. H. Herty, had always envisioned the vast pine area of the South as a potential reservoir of raw material supplying the needs of a great many cellulose-consuming industries. Two years ago when The Chemical Foundation, Inc., contributed additional funds, it became possible to broaden the scope of the research more along the lines of Dr. Herty's original conception.

It is the object of this article to discuss that portion of the research devoted to purified cellulose, with particular reference to progress made in the development of a pulp from Southern pine suitable for the manufacture of viscose rayon.

The advantages of a Southern source of supply for the cellulose requirements of the rayon industry is evident upon the most casual observation. It is not the purpose of this article to dwell on elaborate cost figures or to discuss at length the predominating advantages the South may offer as a source of purified cellulose. Suffice it to mention three factors which bear very heavily in this direction: (1) the presence of an unlimited, self-perpetuating supply of young Southern pine pulpwood available at approximately half the cost of northern spruce; (2) the easy availability of cheap power and nearness to sources of supply of all chemicals required in pulping; and (3) proximity to the consuming mills, with the attendant saving in freight rates.

At the present time, the rayon mills of the South are expending 10 per cent of the cost of their pulp in the form of freight charges. It should be borne in mind that nearly three-fourths of the productive capacity of that industry is located in the South. The accompanying map shows the locations of rayon production in relation to stands of Southern pine pulpwood.

To provide an adequate answer to questions regarding the technical feasibility of utilizing Southern pine cellulose for rayon manufacture, it has been necessary to pursue a series of careful studies into such matters as sulphite pulping conditions, bleaching, control of undesirable impurities such as calcium residues, iron, etc., and then extend these studies to conversions of various experimentally-produced pulps and commercial rayon pulps into viscose rayon for comparative tests.

In the earlier phases of the experimental work, a great many commercial rayon pulps obtained from both manufacturers and rayon plants were compared with pulps produced from pine wood in the semi-commercial plant at Savannah. As shown in Table 1, it was demonstrated that, on the basis of cellulosic purity at least, the pine fibers were entirely suited. It is well known, of course, that a pulp may meet all the required specifications of chemical analysis yet not be adapted for the manufacture of rayon.

Following these preliminary tests, conversion of a batch of pine pulp on a small scale was made voluntarily by a leading rayon plant. To quote from the report on this experiment: "The processing of this pulp on a small scale was quite successful. Spinning was satisfactory, the color of the yarn was about equal to the color obtained with standard qualities of rayon pulp." These encouraging results led to the decision to install a complete bobbin spinning viscose rayon unit to make possible a more comprehensive study of the suitability of various pulps. Since the installation early in 1935, a total of more than one hundred batches of rayon yarn have been spun from various pine pulps and commercial rayon pulps.

There are three rayon processes employed in this country at the present time for the manufacture of rayon: viscose, acetate and cuprammonium. At present, the former is the only process of the three well adapted to the use of woodpulp, and it alone accounts for three-fourths of all the rayon produced.

Raw material for the viscose process is bleached sulphite pulp formed into uniform sheets about 0.04-inch thick. The pulp sheets are steeped for an hour and a half in a mercerizing caustic soda solution, after which period the caustic liquor is allowed to drain from the sheets. Containing a certain amount of hemi-cellulose and a somewhat lowered concentration of caustic, the liquor is brought up to strength and used for subsequent steepings.

**TABLE I**

Comparison of commercial rayon pulps and southern pine sulphite pulps

| | Alpha cellulose content (per cent) | Copper number | Cuprammonium viscosity (centipoises) | Ash (per cent) | Ether extract (per cent) |
|---|---|---|---|---|---|
| Commercial rayon pulps (average of 13)..... | 85.1 | 1.90 | 21.1 | 0.15 | 0.42 |
| Southern pine pulps (average of 4)... | 87.6 | 1.35 | 26.8 | 0.29 | 0.42 |

Following the drain period, hydraulic pressure reduces the weight of alkali-cellulose to approximately three times the weight of the original pulp. The expressed liquor, "press liquor," contains a relatively high percentage of hemi-cellulose. When the caustic liquors build up a certain concentration of hemi-cellulose they become unsuitable for steeping and are

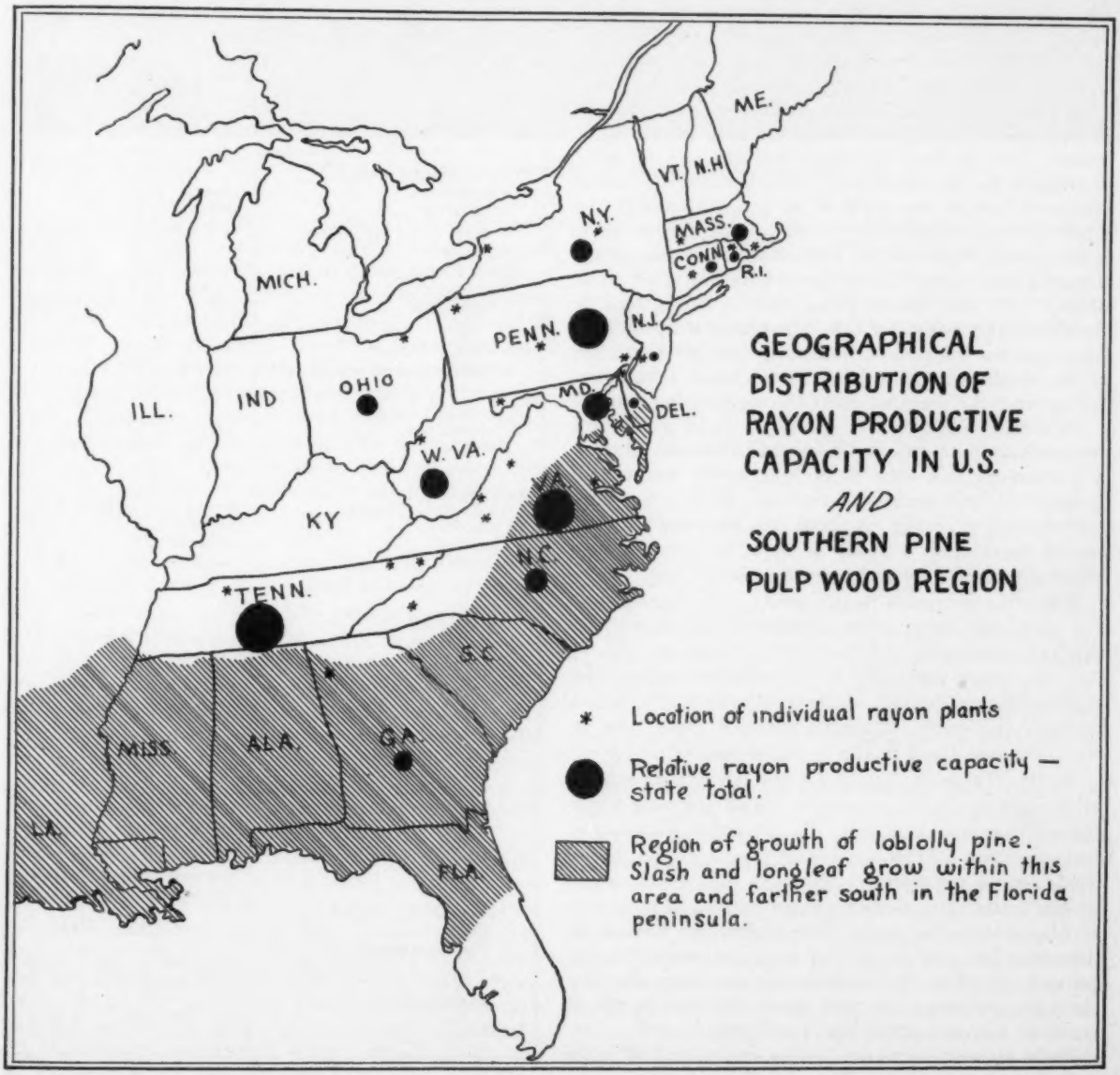
discarded, or, in commercial operation, are dialyzed to remove the hemi-cellulose. A high alpha cellulose content in the pulp is thus desirable as it permits reuse of the caustic liquors more times.

Results in Tables 1, 2 and 4 show pulps produced from Southern pine pulps to compare very favorably with commercial pulps in regard to alpha cellulose content. In Table 2 it will be noted that the drain and press liquors from steepings of pine pulp contained on an average 6.9 per cent hemi-cellulose, based on original weight of pulp, which was slightly less than that for the commercial pulp, 7.1 per cent. Other comparisons are given in Table 4, showing the same favorable relation for the pine pulps. This table also includes results with more highly purified pulps which show a marked reduction in the amount of hemi-cellulose introduced into the steeping liquor.

Because of the high pressure required to express the caustic liquor from the alkali-soaked pulp sheets, they should have sufficient strength to withstand a tendency to crush or split. Under experimental laboratory conditions, the commercial pulp sheets split frequently, whereas sheets of pine pulps resist this pressure successfully. While this is a minor point, it indicates apparently that the long pine fibers are an advantage in this connection.

The pressed sheets of alkali-cellulose are next transferred to a special shredder consisting of two rotating arms with serrated edges working against a serrated saddle. In this operation, the sheets are reduced to a fluffy, crumblike form. The pine pulps usually give a very fluffy alkali-cellulose, represented by a low compactness value, which is considered an advantage in the subsequent xanthating operation.

Following the shredding operation, the alkali-cellulose crumbs are transferred to covered cans and allowed to age approximately three days at 18 deg. C. or two days at 21 deg. C. The viscosity of the pulp, time and temperature of alkali-cellulose aging determine in large part the final viscosity of the viscose



When this aging is completed, the alkali-cellulose is transferred to a xanthating barratte into which a definite amount of carbon bisulphide is introduced under vacuum. The reaction forming the orange-colored cellulose xanthate requires about three hours, during which time the material is churned and the temperature of reaction controlled.

Next, the xanthate is dissolved in dilute caustic soda of a strength and amount to give a viscose of the desired composition which, for example, may be 7.2 per cent cellulose and 6.6 per cent sodium hydroxide. After complete mixing and solution of the xanthate, the viscose is filtered several times through layers of flannel, cotton wadding and fine cambric to remove dirt particles, undissolved fibers and other foreign matter that would interfere in the spinning of the yarn. The presence of swollen, incompletely dissolved fibers in the viscose rapidly renders the filter pads impervious to passage of the viscose and makes frequent changes necessary. Because of the expense involved in changing filters, a suitable rayon pulp must give a viscose of good filterability. Viscoses which microscopic examination reveal as containing no undissolved or swollen fibers invariably pass through the filter press readily without any changes of the filter.

A relative measure of filterability is made by timing the passage of 10 kg. of the viscose through the filter press. Fair to poor solutions require one or more changes of the filter medium. Table 2 shows the viscose prepared from a pine pulp to have approximately the same excellent filterability as the viscoses made from a commercial rayon pulp. Table 4 shows certain of the experimentally produced pulps to give only fair filterability. At the present time, work is being done to determine the reason for this. Increased steeping time has improved the results, indicating possibly that some of the sheets were over-dried, or too thick, thus interfering with the penetration of the mercerizing caustic.

Following filtration, the viscose goes to a constant temperature room where it is aged or ripened. During a portion of this time it is held under vacuum to remove air bubbles in the viscose. With a ripening temperature of 18 deg. C., about four days are required before the viscose is ready to spin, the precise time being determined by a simple coagulation test.

When the viscose is finally ready, it is conveyed to the spinning machine by means of compressed air through a metering pump which regulates the rate of flow of viscose according to its cellulose content and the size of yarn desired. Successively the viscose passes through the pump, a candle filter, a glass tube or "rounder end" and finally to the spinnerette.

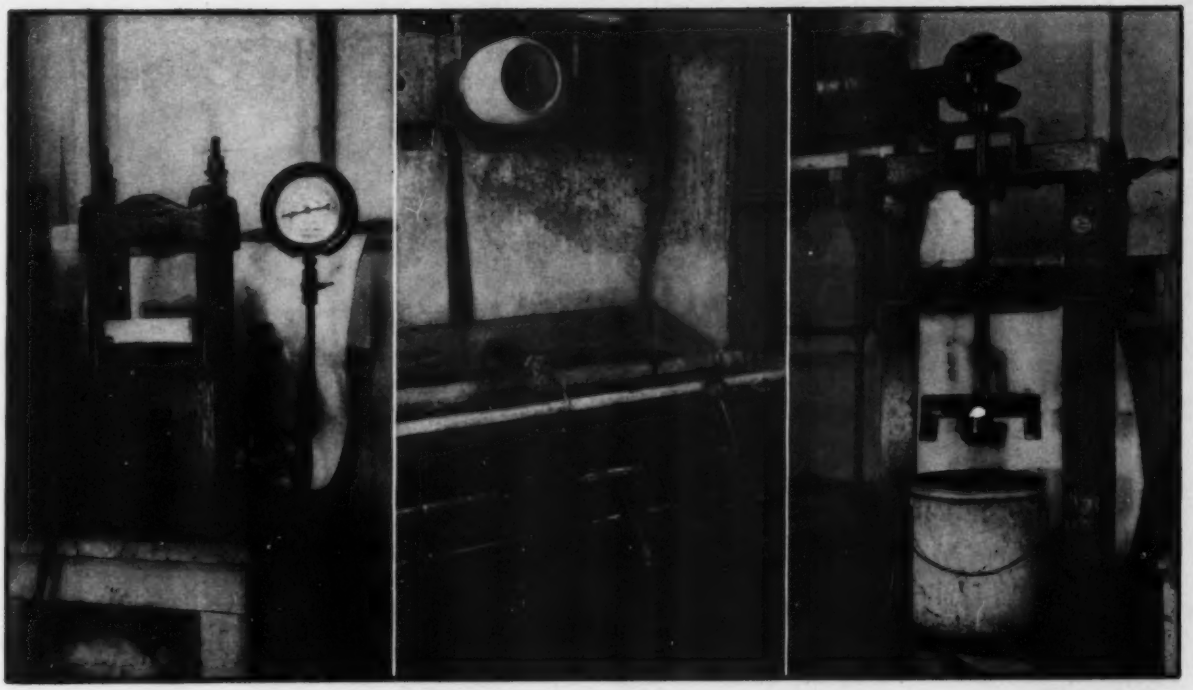
As the viscose is extruded from the minute orifices of the spinnerette it passes into the setting bath where the cellulose is regenerated. The thread of filaments so formed passes up through the acid bath, over a thread guide onto a rotating bobbin. The number of orfices in the spinnerette determines, of course, the number of filaments in the yarn. The greater the number of filaments for a given size of yarn, or, otherwise expressed, the finer the filament size the more desirable the yarn for many purposes, as it will have increased covering power, a softer luster and feel.

Multi-filament yarns are coming into wider and wider

**TABLE II**

Comparison of a commercial rayon pulp and a pulp produced from Southern pine processed into viscose rayon—averages of sextuplicate batches

| Pulp Sample No. | | A | 306–1 |
|---|---|---|---|
| Description | | Commercial *rayon pulp* | Loblolly *pine pulp* |
| *Pulp Tests* | | | |
| Alpha cellulose | per cent | 88.4 | 88.9 |
| Copper number | | 2.20 | 1.96 |
| Viscosity | centipoises | 17.2 | 23.3 |
| Ether extract | per cent | 0.19 | 0.55 |
| Ash | per cent | 0.01 | 0.17 |
| *Steeping* | | | |
| NaOH in steep liquor | per cent | 18.0 | 18.0 |
| Duration of steep | hours | 1.5 | 1.5 |
| Temperature of steep | deg. C. | 21 | 21 |
| Hemi-cellulose in drain and press liquor (based on O. D. pulp) | per cent | 7.1 | 6.9 |
| *Shredding of Alkali-Cellulose* | | | |
| Duration | hours | 3 | 3 |
| Temperature | deg. C. | 25.5–28 | 26–27.5 |
| Compactness of shredded A.-C. | g. per liter | 201 | 168 |
| Alkalinity of A.-C., as NaOH | per cent | 15.23 | 15.21 |
| Cellulose in A.-C | per cent | 30.41 | 30.02 |
| *Aging of Alkali-Cellulose* | | | |
| Duration | hours | 48 | 48 |
| Temperature | deg. C. | 21 | 21 |
| *Xanthation* | | | |
| $CS_2$ added | per cent | 37 | 37 |
| Duration | hours | 3 | 3 |
| Temperature | deg. C. | 24.5-26.5 | 25–26.5 |
| *Filtration of Viscose* | | | |
| Time required for first filtration | minutes | 12 | 15 |
| *Ripening of Viscose* | | | |
| Temperature | deg. C. | 21 | 21 |
| Duration | hours | 64 | 60 |
| *Analysis of Viscose* | | | |
| Alkalinity as NaOH | per cent | 6.40 | 6.45 |
| Cellulose | per cent | 7.15 | 7.12 |
| Viscosity | seconds | 31 | 39 |
| Maturity | c. c. | 9.5 | 8.9 |
| *Spinning* | | | |
| Setting bath | | | |
| $H_2SO_4$ | per cent | 10.0 | 10.0 |
| $Na_2SO_4$ | per cent | 18 | 18 |
| Temperature | deg. C. | 40 | 40 |
| Number of holes in spinnerette | | | |
| *Yarn Tests* | | | |
| Undesulphurized yarn | | | |
| Filament count | | 38.9 | 39.1 |
| Denier | | 153 | 152 |
| Tensile strength | | | |
| Dry | g. per den. | 1.35 | 1.38 |
| Wet | g. per den. | 0.50 | 0.49 |
| Elongation | | | |
| Dry | per cent | 15.3 | 15.5 |
| Wet | per cent | 20.6 | 21.4 |
| Bleached and finished yarn | | | |
| Denier | | 155 | 154 |
| Tensile strength | | | |
| Dry | g. per den. | 1.21 | 1.29 |
| Wet | g. per den. | 0.48 | 0.48 |
| Elongation | | | |
| Dry | per cent | 19.2 | 18.6 |
| Wet | per cent | 20.8 | 20.5 |



**Left—Hydraulic press. Center—One end of bobbin spinning machine. Right—Viscose dissolver**

use and command a price premium. Only high-grade pulps can be used successfully in the manufacture of such yarns because of the added difficulty of spinning the very fine filaments. Most of the experimental work has been confined to the production of 150 denier 40 filament yarns—filaments of 3.75 denier. Several batches of viscose made from pine pulps, however, have been spun through 100-hole spinnerettes into 150 denier yarn. That is equivalent to 1.5 denier per filament, which is as fine a filament as is spun commercially at the present time by the viscose process. We may conclude from this that no difficulty would be experienced in utilizing pine pulps in the production even of these multi-filament yarns.

When a full winding of yarn has been built up on the bobbin it is thorcughly washed to remove acid and then dried on the bobbin. The yarn is then rehumidified, twisted onto a spool and rewound in skein form. The skeins of rayon at this stage are tan in color due to the presence of a small amount of sulphur. There follows a sequence of treatments involving desulphurizing with sodium sulphide solution, washing, bleaching with sodium hypochlorite, acidification with dilute hydrochloric acid, washing, treatment with Turkey Red oil or other softening agents, centrifuging and, finally, drying of the finished rayon.

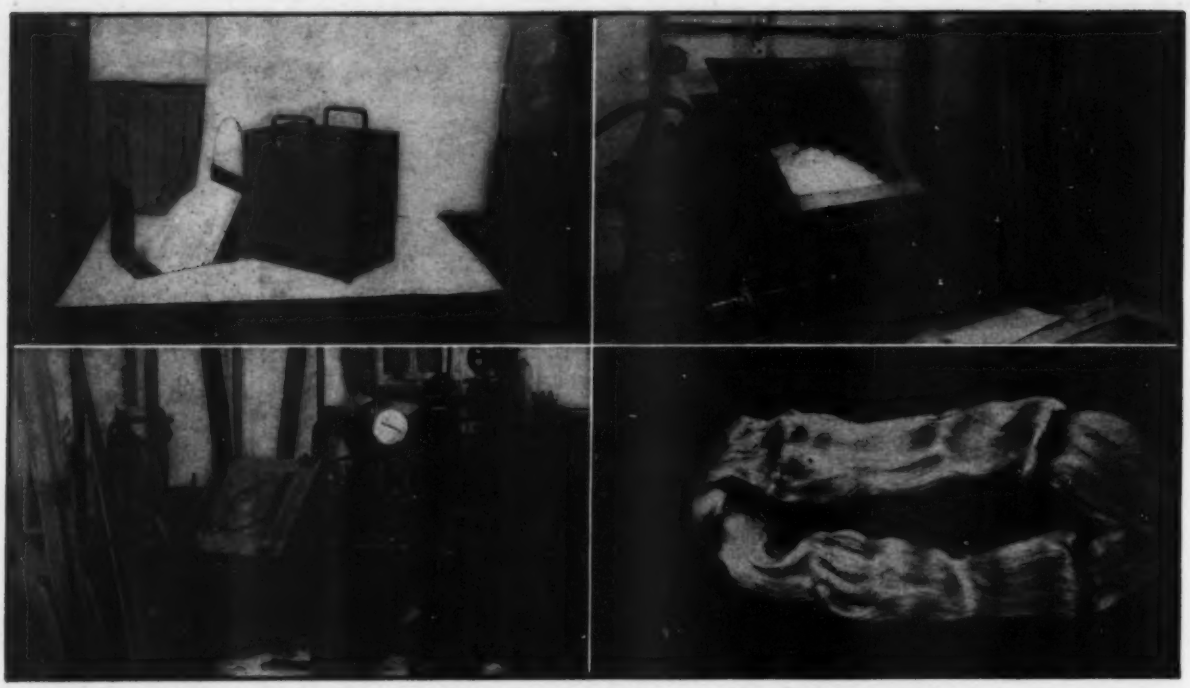
A very important consideration, of course, is strength of yarn. Table 2 gives in some detail the data in connection with the preparation of rayon from a loblolly pine pulp and a commercial rayon pulp of recognized high quality. Each value given is the average of values obtained in sextuplicate batches, all processed identically. It will be noted that the strengths of the yarn made from the two pulps are practically the same, a slightly higher dry strength being obtained in the case of the pine pulp. In other properties such as color, appearance, hand, etc., the yarns were indistinguishable. The conditions used in this series were such as to give relatively low strength as compared to commercial yarns. Table 3, below, sets forth tests obtained on four commercial viscose rayon yarns purchased on the open market.

**TABLE III**

Commercial Viscose Rayon Yarns

| | Sample | | | |
|---|---|---|---|---|
| | A | B | C | D |
| Luster | bright | bright | semi-dull | dull |
| Denier | 150 | 150 | 150 | 150 |
| Filaments | 40 | 40 | 40 | 40 |
| Tensile strength, g. per denier | | | | |
| Dry | 1.54 | 1.80 | 1.50 | 1.41 |
| Wet | 0.65 | 0.91 | 0.77 | 0.63 |
| Elongation, per cent | | | | |
| Dry | 19.6 | 20.8 | 23.0 | 21.0 |
| Wet | 27.4 | 32.6 | 31.1 | 27.8 |

Table 4 records the data obtained on a number of different pulps when processed into rayon using conditions giving yarns more nearly representative of commercial yarns in point of strength characteristics. In this series, steeping and aging temperatures were maintained at 18 deg. C. instead of 21 deg. C. as used in the first series. Also, instead of spinning in the simple setting bath comprising 10 per cent sulphuric acid and 18 per cent sodium sulphate, the composition was changed to 8.2 per cent sulphuric acid, 18 per cent sodium sulphate, 4 per cent glucose and 1 per cent zinc sulphate. Each pulp was processed in exactly the same manner. Three commercial rayon pulps were tested, including



**Above: (left) Steeping tank and wire basket for holding pulp sheets. (right) Shredder, half raised, showing charge of alkali-cellulose crumbs. Below: (left) Xanthating barratte. (right) Skein of rayon produced from Southern pine**

**TABLE IV**

Comparison of Commercial Rayon Pulps and Pulps produced from Southern woods processed into viscose rayon

| Viscose batch No. | | 97 | 114 | 112 | 104 | 111 | 100 | 103 | 110 | 113 |
|---|---|---|---|---|---|---|---|---|---|---|
| Description of Pulp | | Commercial Rayon Pulps | | | Bleached Sulphite Pulps Produced in Experimental Plant | | | | | Commercial Southern Pine Sulphate Pulp Bleached in Experimental Plant |
| | | A Spruce | B Spruce | C Spruce | 306-2 Loblolly Pine | 265 Longleaf Pine | 310 Loblolly Pine | 311 Longleaf Pine | 250 Tupelo Gum | |
| Alpha cellulose | per cent | 88.4 | 85.4 | 92.0 | 89.4 | 88.4 | 93.6 | 92.8 | 86.9 | 84.1 |
| Copper number | | 2.20 | 1.65 | 0.79 | 1.59 | 2.19 | 1.16 | 1.13 | 2.57 | 0.89 |
| Viscosity | centipoises | 17.2 | 26.9 | 24.2 | 24.3 | 27.6 | 15.2 | 12.6 | 22.7 | |
| Ash | per cent | 0.01 | 0.15 | 0.08 | 0.13 | 0.21 | 0.12 | 0.08 | | 0.49 |
| Ether extract | per cent | 0.19 | 0.41 | 0.06 | 0.58 | 0.40 | 0.06 | 0.04 | 0.32 | 0.43 |
| Hemi-cellulose in drain and press liquors, based on original O. D. pulp | per cent | 6.1 | 7.7 | 3.1 | 7.3 | 6.6 | 2.6 | 2.3 | 10.9 | 7.5 |
| Compactness of alkali-cellulose crumbs | g. per liter | 190 | 174 | 199 | 175 | 172 | 164 | 179 | 159 | 203 |
| Filterability of viscose | | Excellent | Excellent | | Excellent | Fair | Fair | Fair | Fair | Fair |
| Viscosity of viscose | seconds | 32 | 49 | 47 | 48 | 42 | 30 | 29 | 51 | 42 |
| Tests of bleached yarn Filament count | | 39.2 | 39.4 | 39.7 | 40 | 39.6 | 38.6 | 39.3 | 39.8 | 39.4 |
| Denier | | 154 | 164 | 155 | 157 | 161 | 158 | 156 | 161 | 167 |
| Tensile strength Dry | g. per den. | 1.43 | 1.52 | 1.64 | 1.59 | 1.48 | 1.59 | 1.57 | 1.56 | 1.44 |
| Wet | g. per den. | 0.61 | 0.66 | 0.80 | 0.67 | 0.60 | 0.74 | 0.66 | 0.65 | 0.54 |
| Elongation Dry | per cent | 19.1 | 20.6 | 22.9 | 19.5 | 19.9 | 21.4 | 19.7 | 21.6 | 18.7 |
| Wet | per cent | 22.7 | 27.2 | 32.4 | 25.5 | 26.0 | 28.6 | 25.4 | 29.6 | 24.4 |

one highly purified pulp. Among the pine pulps are Nos. 306-2 and 265, prepared respectively from loblolly and longleaf, and bleached in a single-stage treatment with sodium hypochlorite. Nos. 310 and 311 were likewise prepared from loblolly pine and longleaf but were given an intermediate treatment to increase the alpha cellulose content. The rayon yarns made from pine pulps compared very favorably with the commercial rayon pulps made from spruce in strength, color and other properties.

Of interest was a batch of rayon produced from a semi-hard wood. Gum, next to pine, is the most common wood in the South. The wood pulps readily by the sulphite process, yielding a very clean, easy-bleaching fiber. The rayon produced from it compared very favorably with that produced from other pulps. Because of the shortness of the fiber, however, it might prove to be difficult to handle in the steeping press.

While bleached sulphate has apparently never been considered seriously for rayon manufacture, there appears to be no good reason why it could not be used if it proved economical to do so. Batch No. 113 was processed from a laboratory hard-bleaching commercial kraft pulp, with results as given in Table 4. The color of the rayon compared favorably with that of the other yarns. Undoubtedly much better results could be obtained with sulphate pulp cooked for easy-bleaching. Work in this connection is in progress.

On the basis of the results set forth in this article and many others accumulated during the past year, pine sulphite produced by standard pulping procedures has been found to compare favorably with commercial pulps both in its behavior at various steps of viscose processing and in the characteristics of finished rayon made from it.

This country produced 254 million pounds of rayon in 1935, double the 1930 production. Without attempting to forecast the situation, in another five years the industry unquestionably will require vast new quantities of raw material. Southern pine is the answer to whatever demands the rayon industry may make for a new source of low-cost purified cellulose.

# Split Set Nomograph

**D. S. DAVIS**
Dale S. Davis' Associates

IN connection with the winding of paper on the reel, winder, and rewinder it is usual practice to "flag" the close of each day in order to facilitate production accounting. Flagging is accomplished by the insertion of a piece of colored paper or cloth and it falls to the lot of someone to estimate the distribution of the weight of the paper between the successive days, using the flag as a guide.

It is clear that an inch of paper near the edge of the roll weighs considerably more than an inch at the center and a great deal more than an inch very near the core so that visual estimation is extremely uncertain at best. There is evident need for a rapid graphical method of set splitting based upon sound geometrical considerations and simple enough to be used by anyone. The accompanying alignment chart meets these requirements and it is founded upon the following facts and reasonable assumptions. In Figure 1,

Let $x$ = distance, core to any flag-point
$X$ = distance, core to edge of roll
$d$ = diameter of the core
$w$ = weight of paper between core and any flag-point
$W$ = weight of paper in the entire roll

Considering the end of the roll, the area of paper between the core and any flag-point is

$$\pi [(d/2 + x)^2 - d^2/4] \text{ or } \pi x (d + x)$$

Similarly, the total area between the core and the edge is

$$\pi X (d + X)$$

Assuming that the moisture content, bulk, and winding tension are uniform throughout it is seen that the respective ratios of the weights and end areas of the paper in the partial roll and in the entire roll are equal. That is,

$$\frac{w}{W} = \frac{x (d + x)}{X (d + X)}$$

which is the equation upon which the chart is based. The expression holds for any consistent units of weight and length, but the nomograph is built especially for the common core diameters of 3.5, 4.5, and 5.58 inches. Note that the chart deals with the easily determined distances out from the core and not with roll diameters which are usually more difficult to measure.

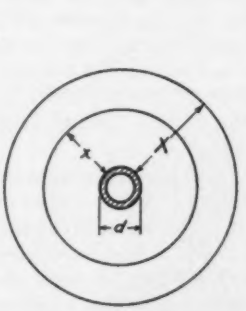



Figure 1

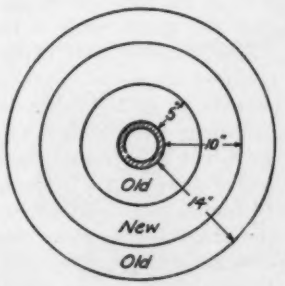



Figure 3

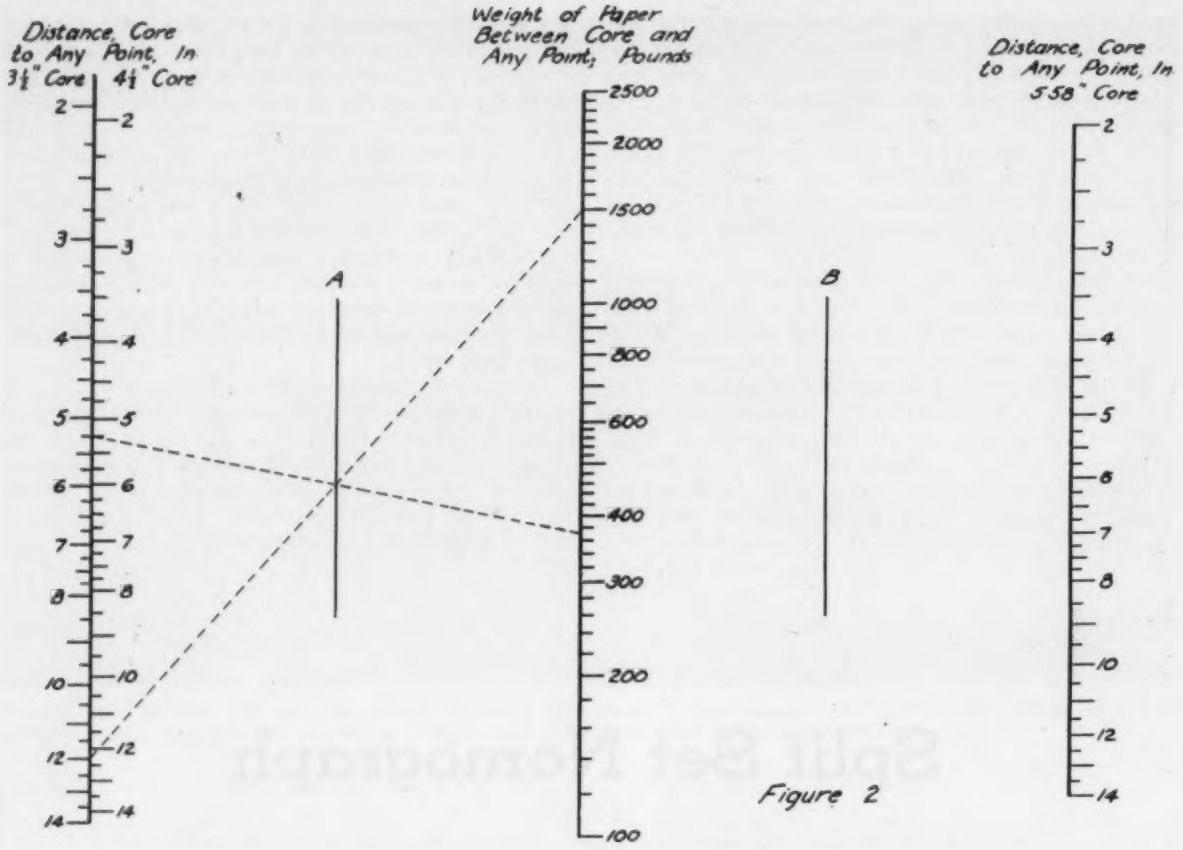



Figure 2

The use of the chart (Figure 2) is illustrated as follows: On a rewinder at the close of a day a flag is found at a point 5.25 inches from the 3.5-inch core. When completed the roll is found to weigh 1500 pounds and to have attained a depth on the core of 12 inches. How much of this paper is between the core and the flag, that is, how much of this set should be credited to the day just ended? Following the broken lines, connect 1500 on the central weight scale with 12 on the distance scale at the extreme left and note the intersection with the A-axis. Connect this intersection with 5.25 on the same distance scale and produce the line to meet the weight scale in the desired value, 370 pounds. Three hundred and seventy pounds, then, should be credited to the closing day and 1500 — 370 or 1130 pounds to the following day.

Twenty-five hundred pounds of paper are wound on a 4.5-inch core to a depth of 14 inches. What weight of paper corresponds to the inch of depth between 13 and 14 inches, 8 and 9 inches, and 2 and 3 inches? Using the chart in the same manner, but working with the distance scale marked for 4.5-inch cores, it is possible to obtain the values tabulated below:

| Depth on Core, inches | Weight at Corresponding Depth, pounds | Difference in Weight, pounds |
|---|---|---|
| 14 | 2500 | 300, 13 to 14 in. |
| 13 | 2200 | |
| 9 | 1175 | 210, 8 to 9 in. |
| 8 | 965 | |
| 3 | 217 | 92, 2 to 3 in. |
| 2 | 125 | |

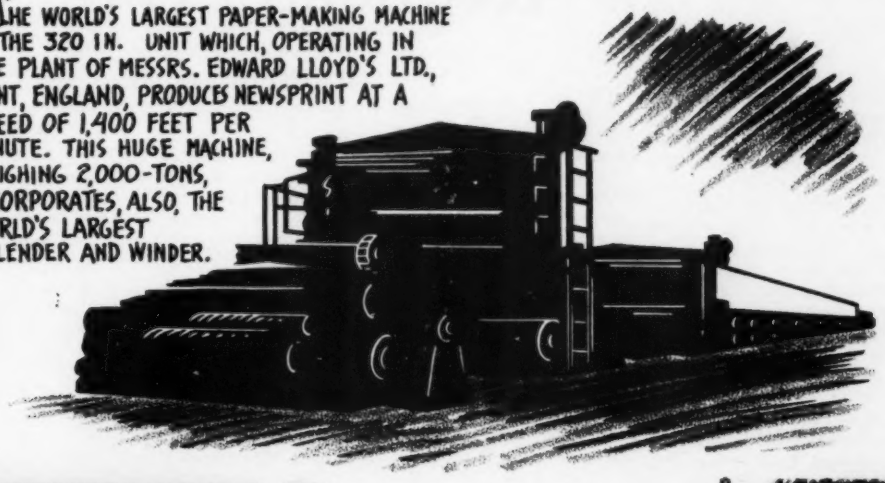
The close of a day finds paper wound on a 5.58-inch core to a depth of 5 inches. At this time, the machine reel contains a quantity of paper made during the day just closing. This is marked with a flag and paper made at the beginning of the new day is wound on top of it. Later, in the new day, this paper is wound from the reel to the winder and flagged properly. When the set on the winder is completed, it exhibits a zone of new-day paper between two zones of old-day paper, flags appearing at distances of 5 and 10 inches from the core, as indicated in Figure 3. The completed set shows a depth of 14 inches on the core and weighs 2400 pounds. How shall the set be distributed between the old and new days?

Working entirely in the right half of the chart, connect 2400 on the weight scale with 14 on the distance scale and note the intersection with the B-axis. Connect this point with 10 on the distance scale and produce the line to meet the weight scale in the value 1360 pounds. Further, connect 5 on the distance scale with the intersection on the B-axis and produce the line to meet the weight scale in the value 460 pounds. The inner zone between the 5 and 10-inch flags is new-day paper and weighs 1360—460 or 900 pounds. The balance of the set, 2400 — 900 or 1500 pounds is old-day paper and is the weight of the combined inner and outer zones.

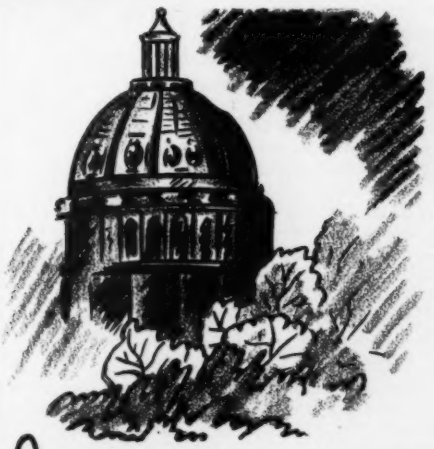
While the chart is designed for core diameters of 3.5, 4.5, and 5.58 inches, it can be used without serious error where the diameters of the cores are within one-half inch of these values.

# Paper Sketches ---

THE WORLD'S LARGEST PAPER-MAKING MACHINE IS THE 320 IN. UNIT WHICH, OPERATING IN THE PLANT OF MESSRS. EDWARD LLOYD'S LTD., KENT, ENGLAND, PRODUCES NEWSPRINT AT A SPEED OF 1,400 FEET PER MINUTE. THIS HUGE MACHINE, WEIGHING 2,000-TONS, INCORPORATES, ALSO, THE WORLD'S LARGEST CALENDER AND WINDER.



UNPREPARED TO SUPPLY CARTRIDGES NEEDED FOR THE BATTLE OF THE BRANDYWINE, THE FRATERNITY OF GERMAN DUNKERS WHO OWNED THE PAPER MILL AT EPHRATA, PENNSYLVANIA, PLACED AT THE DISPOSAL OF THE CONTINENTAL ARMY, SEVERAL TWO-HORSE LOADS OF AN EDITION OF FOX'S BOOK OF MARTYRS, THEN READY FOR THE BINDERY.



ALTHOUGH OFFERED "EQUAL-QUALITY" PAPER AT A 25% SAVING BY AN AMERICAN MANUFACTURER, THE U.S. CONGRESS, IN 1820, CONTINUED IN ITS USE OF ENGLISH MADE PAPER.

DURING EARLIEST ROMAN DAYS, PUBLIC RECORDS AND LISTS OF MAGISTRATES OFTEN WERE WRITTEN ON LINEN. IN THE REIGN OF AURELIAN (270 TO 275 A.D.) COPY BOOKS WERE SAID TO HAVE BEEN MADE FROM THE SAME MATERIAL.

# How Power Factor Improvement Reduces Power Cost

**R. C. ALLEN, Industrial Engineer**
**Westinghouse Electric & Manufacturing Company**

THERE are few plants of large capacity where a study of the electric load would not show desirable results for an adequate correction of the existing power factor. Paper mills, like most plants, generally are laid out, originally, for best production and balanced operation at or near full capacity. Yet many actually are operating at nearer half load a good portion of the time.

A plant grows and production schedules are changed from time to time with the result that a well balanced condition does not always exist in the electrical distribution system.

With the present keen competition and insistence of the management for a reduction in manufacturing costs, the benefits to be derived from improving the plant power factor should not be overlooked.

Causes for low power factor may be—

1. Over-motoring, the result of:
   (a) Change in production schedule.
   (b) Installing motors of ample capacity to meet any emergencies.
   (c) Lack of sufficient information to check the motor sizes closely.
2. Variations in the production schedule with corresponding variations in motor load.
3. Low speed induction motors.
4. Units that run light a greater portion of the time.
5. Maintenance of too high feeder voltage.

These conditions may apply to one or more feeder lines, or to the plant as a whole.

Generally, the power factor problem becomes vital only when plant additions or increased production requires more power from the already fully loaded system. The justification for incurring any expense to raise the power factor in an industrial plant is always the saving or economic advantages resulting from the change. Correcting for low power factor to any extent usually requires the expenditure of capital and to be justified must show adequate return. Not infrequently, however, an investment made to improve the power factor conditions show better return than if the same capital were invested in the business itself.

Under any conditions of power supply, power factor correction is an economic problem, and one of the first questions to be solved or answered is: "How high is it economical to raise the power factor?" The answer depends on the cost of the corrective equipment and the return or savings that may be effected by their installation. This can be determined only by an analysis of all the factors. Correcting beyond 90 per cent seldom shows a satisfactory return because of the corrective kv.-a. and, consequently, the cost of equipment increases rapidly as 100 per cent is approached. For instance, to raise the power factor of a load of 100 kw. from 80 to 85 per cent power factor requires 13 corrective kv.-a., whereas to raise the same load from 95 per cent to 100 per cent power factor requires 33 kv.-a., or over 2½ times as much (Figure 1).

When power is purchased, the prime incentive, and the one generally used to justify the installation of suitable equipment, is the clause in the power contract which makes possible a reduction in the monthly power bills. This is a very definite and tangible proposition and savings thus effected become evident the first month after the power factor is improved.

Where power is generated in the plant, the most common incentive or reason for the correcting of the power factor is to obtain a few more kw. from a generator or transformer which already is loaded

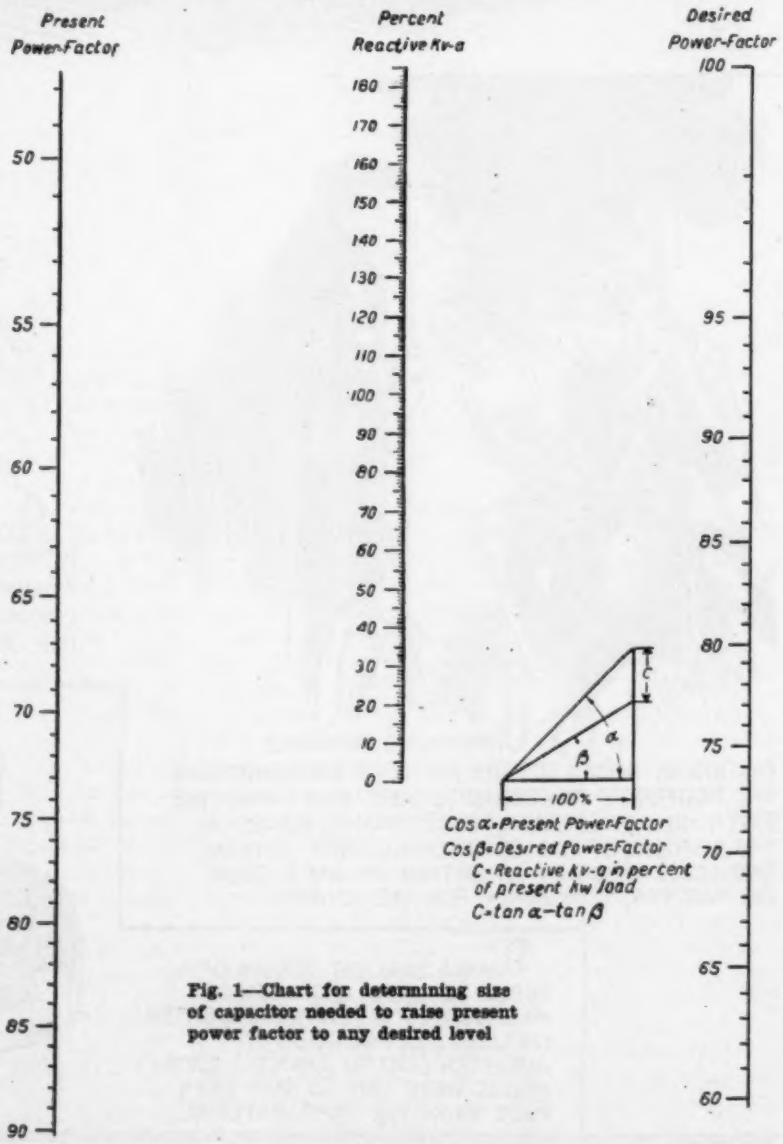



**Fig. 1—Chart for determining size of capacitor needed to raise present power factor to any desired level**

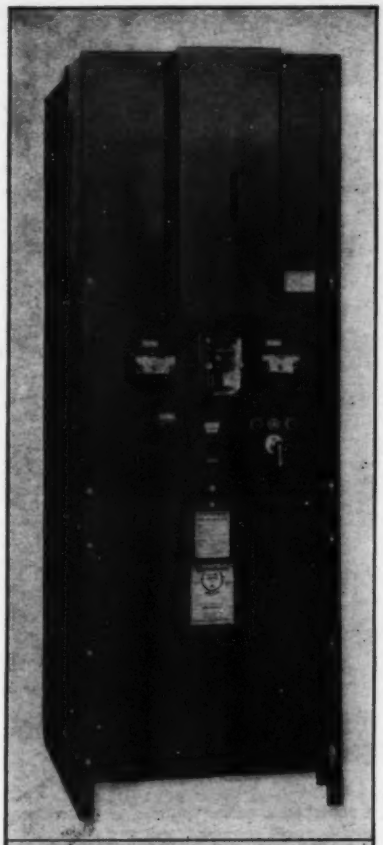


Fig. 2 — (above) Capacitors often are grouped and used as a unit

Fig. 3—(below) Unit-type capacitor for installing with individual motors. When connected to the motor terminals no additional equipment is required as the motor starters function as its disconnect

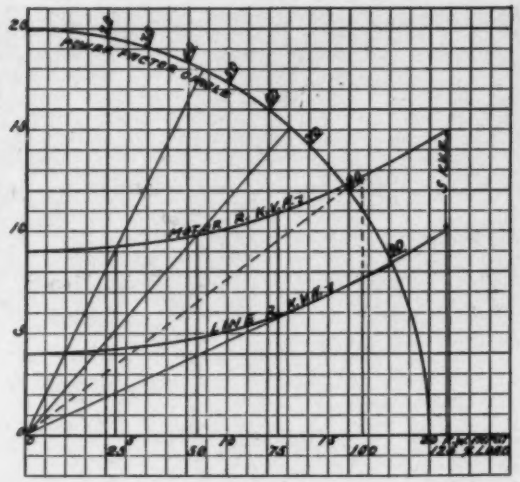
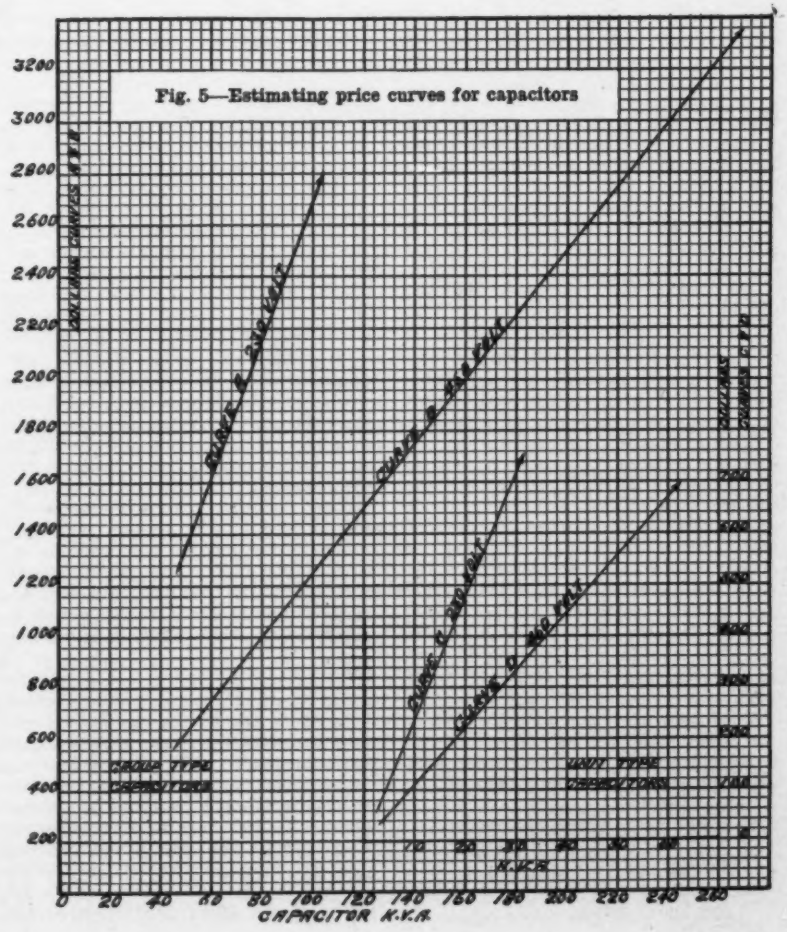


Fig. 4 — Corrective effect of a 20 hp., 705 r.p.m. squirrel cage induction motor at various loads. Upper curve shows R.K.-va. taken by the motor, and lower curve shows the R.K.-va. taken from the line with the capacitor connected

| | HP | Eff. per cent | P.F. per cent | Kw. | R. K-va. | Corrected P.F. per cent |
|---|---|---|---|---|---|---|
| Full Load | 20 | 90 | 79 | 16.6 | 12.8 | 91.0 |
| ¾ Load | 15 | 90.5 | 75 | 12.4 | 10.9 | 90.5 |
| ½ Load | 10 | 89.4 | 65 | 8.4 | 9.8 | 86.5 |
| ¼ Load | 5 | 84 | 44 | 4.5 | 9.2 | 72.5 |



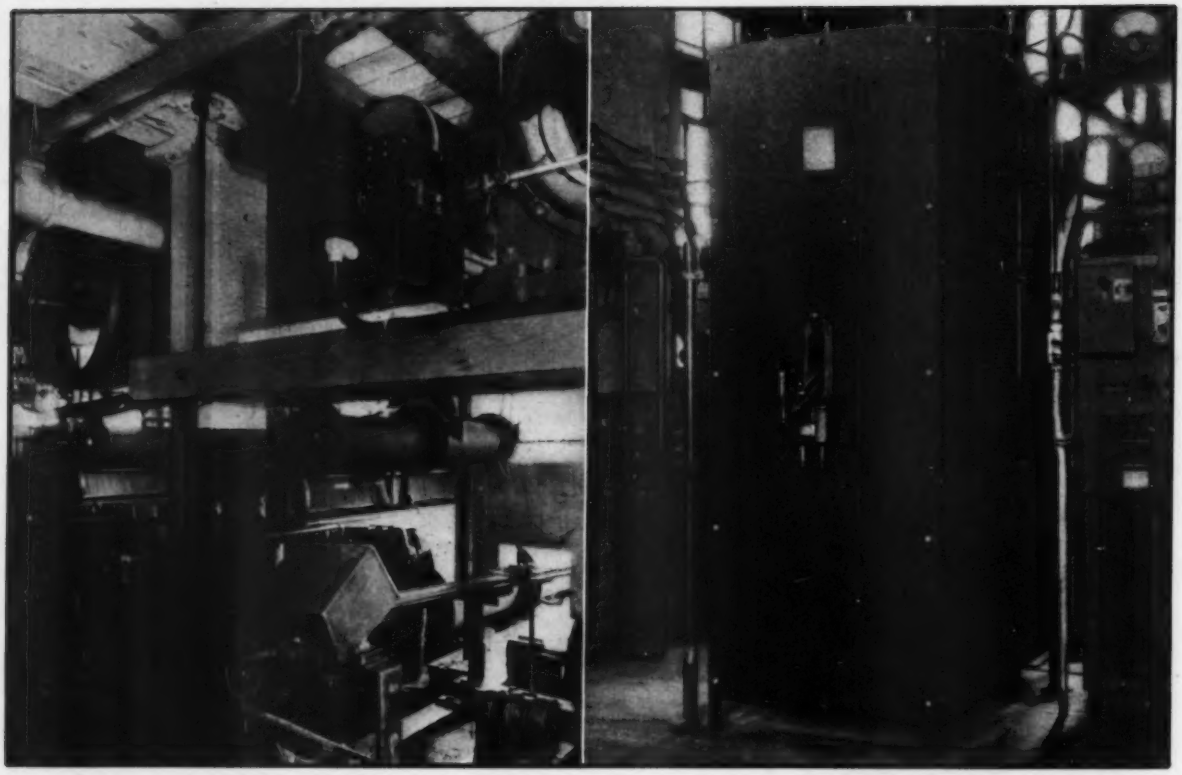


**Fig. 6 (left)—30 K.-va., 3-phase, 60 cycle, 460 volt small rack type capacitor installed near driving motor**
**Fig. 7 (right)—120 K.-va., 2300 volt large rack type capacitor installed in switchboard room of a power plant**

to, or perhaps beyond, its kv.-a. rating. With such, the installation of corrective equipment also pays dividends immediately, since added generator capacity has been made available at very low cost and may be utilized immediately.

Sometimes the larger industrial plants purchase power at high voltage and own the transformers and sub-station equipment. When such equipment becomes loaded to its kv.-a. capacity, similar conditions exist as in the plant making its own power. In other words, an improvement in power factor makes it possible to carry more plant or kw. load instead of purchasing additional transformers.

Where generator or transformer capacity is released, the value of this capacity cannot be considered as just the cost per kv.-a. of this equipment. Beside the generator, an engine or turbine, boiler house equipment, etc., are required, as well as space for this equipment necessitating at least floor space and possibly additions to the power house. Consequently, a few dollars in corrective equipment sometimes may pay high dividends where correctly evaluated.

The more usual methods for raising the power factor are as follows:

1. Relocating motors for better loading or installing new ones of correct rating.
2. Installing synchronous motors for low speed drive or for the larger induction motors wherever possible.
3. Installing gear motors for smaller low speed drives.
4. Using power factor corrective equipment such as:
   (a) Synchronous motors having leading power factor.
   (b) Capacitors at individual motors or for group correction.
   (c) Synchronous condensers.

In most plants continual changes and demands for increased production have changed the loading of motors, extended the circuits, or increased the number of motors on the circuits, while modern motors using full voltage starting may have been added on new applications, so that materially different load conditions may exist on the system than as originally laid out. This generally results in the circuits carrying heavy loads at low power factor.

Such a condition results in an undesirable loading on the feeders with low voltage at the motors, and with an excessive line loss. The accompanying table shows the resulting per cent increase of line drop and kw. loss on feeders loaded in excess of the original layout.

The results of low power factor on feeder lines are generally not serious if the feeders are not overloaded, except that, of course, the feeder loss is higher than necessary. The chief objection comes when the desired electrical load cannot be installed without additional feeder capacity. Loading feeders beyond their capacity not only causes high line loss, but more particularly results in low voltage at the motors. Although this does not affect production to any extent, provided the frequency is maintained, it does affect the starting characteristics of the motors and may be objectionable, if not serious, for certain drives, such as Jordans, beaters, compressors, or where quick acceleration is desirable, since the motor torques are reduced as the square of the voltages.

Occasionally a study will show that only a re-arrangement of the motors for better loading, locating motors on other feeders, or a change in excitation of the synchronous machines, may show surprising results with little or no expenditure. In one case, brought to the author's attention, a re-arrangement of load on various synchronous motor gen-

| Power Factor per cent | Amperes per cent | Line Drop per cent | Line Loss per cent |
|---|---|---|---|
| 100 | 100 | 100 | 100 |
| 90 | 111 | 100 | 124 |
| 80 | 125 | 125 | 156 |
| 70 | 143 | 143 | 204 |
| 60 | 167 | 167 | 278 |
| 50 | 200 | 200 | 400 |

erator sets, with a better or "correct" excitation on the motors, greatly reduced the power bill without the expenditure of a dollar for new equipment.

Any correction of power factor is a step in the right direction, but if the motors can be re-arranged for better loading or synchronous motors used, there is seldom any question about the

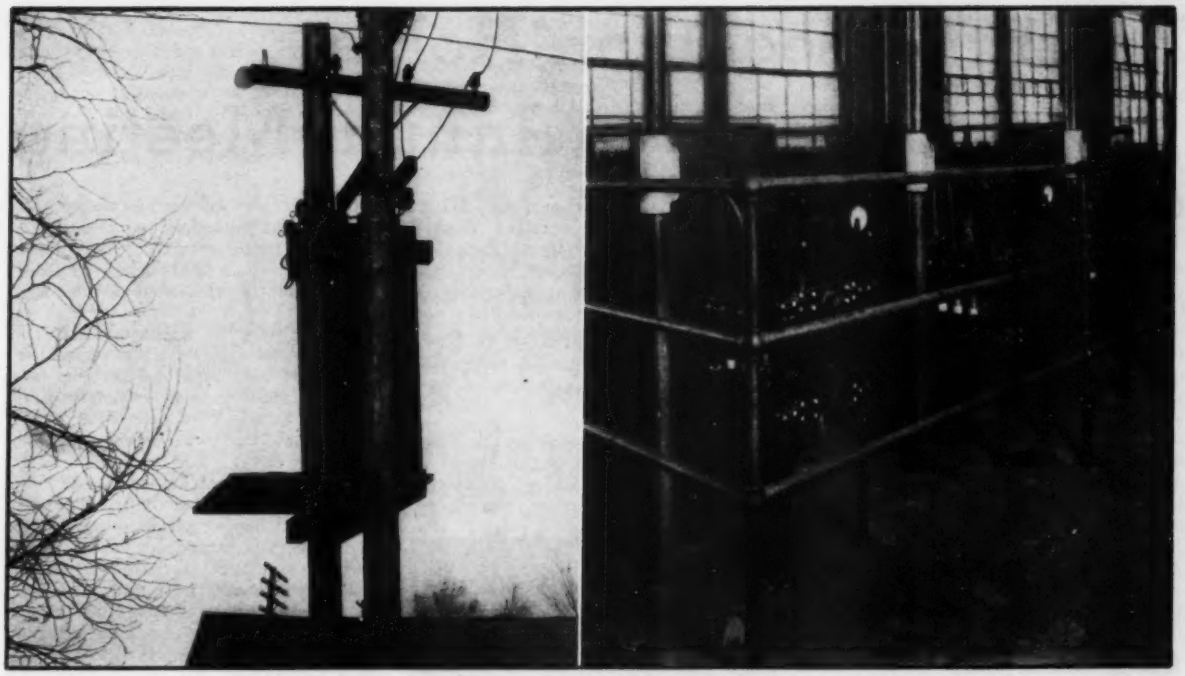


**Fig. 8 (left)—120 K.-va., 2300 volt pole-type capacitor mounted outdoors**
**Fig. 9 (right)—900 K.-va., capacitor installation in a large manufacturing plant**

economic value of the expense, since the charge against the power factor correction is relatively small for the benefits received.

When purchasing new equipment, consideration always should be given to the possible use of synchronous motors for various drives. Motor generator sets, beaters, Jordans, vacuum pumps, air compressors, and large pumps, are generally driven by synchronous motors, and where it is or may be desirable to materially improve the power factor, these should be specified with leading power factor capacity and other synchronous drives should be considered. Efficiencies on these motors generally are higher than for induction motors at all loads, but the power factor, instead of being lagging, is either 100 per cent with no wattless current, or leading, usually 80 per cent, and thus greatly reducing the wattless current, which otherwise would have to be handled by the line and generating system.

To obtain a plant power factor, which will show the greatest economic returns, it is frequently necessary to install equipment for corrective kv.-a. only. As previously indicated, this may be either capacitors (formerly called static condensers) or synchronous condensers, even an 80 per cent power factor synchronous motor, operated without its load as a condenser. (Since the advent of the low loss, multi-unit, low price capacitor, industrial plant conditions seldom justify the use of synchronous condensers.) These capacitors can be installed as individual units with the motors, as groups in various parts of the plant for correction on individual feeders, or as a group for the correction of the plant power factor as a whole.

Where the feeders themselves are not overloaded, locating the required corrective capacity as a condenser group at a single point probably will give the most satisfactory results and is generally the arrangement used (Figure 2).

Where one or more motors are causing the low feeder power factor, a capacitor at each motor to secure the desired results is the best method though not always the least expensive (Figure 3). A more uniform plant power factor is thus maintained for all loads, and the capacitor is disconnected when not required. Figure 4 shows the effect of a 5 kv.-a. capacitor on the power factor of a 20 hp. squirrel cage motor at various loads.

The extent to which power costs actually will be reduced by bettering the plant or feeder power factor can, therefore, be determined only by an economic study of the plant conditions, the possible methods for power factor improvement, and the net returns, i.e., reduction in gross cost for power as against the expenditure required to secure this improvement. Equipment purchased for power factor correction not infrequently results in returns sufficient to pay for this expense in from one to three years. After that the savings continue, with no appreciable expense, and return profitable dividends on the investment.

## ◆ Power Show and Conference

The educational phase of the power industry will be heavily emphasized at the Midwest Engineering & Power Exposition and the Power Engineering Conference April 20-24 in Chicago, according to plans being developed, said G. E. Pfisterer, manager of the exposition.

These plans are being pushed vigorously by the Power Conference, says Frank D. Chase, President, who believes the power industry is in urgent need of bringing forcefully to the attention of the public what the industry has done and is doing for the general welfare.

To show by contrast what has been accomplished in the last 200 years, several universities have promised displays of old models of engines and power equipment. This will be a fitting scene for the 200th anniversary of the birth of James Watt.

Coal companies will have exhibits of model coal mines, particularly showing the hoisting and sorting of coal. Similarly, diesel and internal combustion engine manufacturers are concentrating on understandable exhibits of their products. Electricity will also be emphasized, as will gas and steam power.

Many of the 250 companies showing at the exposition are building concrete examples of equipment and educational phases of their lines. The exposition will be held in the International Amphitheatre.

All major activities of the conference program are virtually complete. There will be 12 sessions with approximately 35 papers by leading engineers, each a recognized authority in his field. The program has been organized with the cooperation of the various participating engineering societies.

Morning sessions of the conference will be held in the Palmer House and the afternoon meetings will be in the Amphitheatre. Special transportation has been arranged.

# Parent Association Holds Annual Meeting

THE fifty-ninth annual convention of the American Paper and Pulp Association and affiliated organizations was held in the Waldorf-Astoria Hotel, New York, February 17 to 21, inclusive. Reflecting the marked improvement in paper business and in the industrial situation generally, the attendance at this year's get-together of paper manufacturers, converters, merchants and suppliers is believed to have established a new high record, though no statistics on the matter are extant. The famed Peacock Alley and the other lobbies, corridors and meeting rooms of the Waldorf-Astoria were literally jammed with paper men for the full five days of the convention, and it was a consensus of opinion that a greater number attended this convention than in any previous year.

**Sensenbrenner Re-elected President**

At the annual meeting of the Board of Governors and Executive Committee of the American Paper and Pulp Association, held on the first day of the convention, Frank J. Sensenbrenner, president of the Kimberly-Clark Corporation, Neenah, Wis., was re-elected president of the Association for the second year. The following vice presidents of the parent association were elected:

Hugh J. Chisholm, Oxford Paper Company, New York City.

Stuart B. Copeland, Eastern Manufacturing Company, Bangor, Me.

Richard J. Cullen, International Paper Company, New York City.

A. C. Goodyear, Bogalusa Paper Company, Bogalusa, La.

D. Clark Everest, Marathon Paper Mills Company, Rothschild, Wis.

H. L. Jenkins, George O. Jenkins Company, Bridgewater, Mass.

John R. Miller, West Virginia Pulp and Paper Company, New York City.

Z. W. Ranck, Crystal Tissue Company, Middletown, O.

John L. Riegel, Riegel Paper Corporation, New York City.

Sidney L. Willson, American Writing Paper Company, Inc., Holyoke, Mass.

Norman W. Wilson, Hammermill Paper Company, Erie, Pa.

J. D. Zellerbach, Crown Willamette Paper Company, San Francisco, Cal.

Reversing the former order of the program, the open general meeting of the American Paper and Pulp Association was held on the opening day of the convention, with the sessions of the various individual groups following. In the past it had been the custom for all of the different groups making up the American Association or affiliated with it to hold their meetings, and the convention to close with the open general meeting of the parent body.

After opening the general A.P. & P.A. meeting, at which he presided, flanked on either side by Secretary Charles W. Boyce and Carl E. Whitney, association counsel, President Sensenbrenner greeted the Association members and guests, and then delivered his annual address, as follows:

**President Sensenbrenner's Address**

We are assembled today in the Fifty-Ninth Annual Meeting of the American Paper and Pulp Association. From this meeting we will go to group meetings for discussion of current problems. We bring to our discussions a broad experience of fifty-eight years of cooperative activities, which during the last three years have been far more intensive than ever before. In this experience we have the basis for intelligent, unemotional, competent discussion.

F. J. Sensenbrenner, who was re-elected president of the Association

Yet in spite of this experience there is uneasiness in the industry. I want to discuss this today, for I know that if it is not understood and frankly faced we will have trouble.

Many business men are today beset with uncertainties and doubts. The trend toward Governmental control, apprehension as to the consequences of the mounting public debt, the rumblings of war, inflation, so-called radicalism and a long list of other things breed worry if not downright fear. Despite a business year that, compared with its recent predecessors, was extraordinarily good, optimism is superficial; on the verge of breaking through, pessimism lies just beneath the surface. The confidence that is essential in modern business is being leached by these doubts and fears.

Manufacturers are subject not only to these general influences but also to uncertainties peculiar to their own industries. I want to name some of those most frequently mentioned in the paper industry.

The industry is apparently on the verge of another wave of expansion. Rumors of new mill construction are being confirmed in fact. If consumption increases do not keep pace with expansion, competition will exceed even its normal severity.

Our marketing structure has become even more complicated than it has been in the past. Buying pressure has tended to concentrate. Opposing forces about the price structure are powerful. Costs have risen substantially and their rise continues month by month with, to me, no end in sight. A very real inflation translated into commodity prices is not yet unthinkable. But consumption has not yet reached that sustained level that guarantees price firmness. Many manufacturers seek greater volume, and this makes the market sensitive to price pressure; and many of these manufacturers apparently give little heed to the sign posts of increasing costs.

Many companies are financially weak; they are forced to convert materials into cash without regard to values. Their sales undercut the market; they tend to force all manufacturers to sacrifice profit.

Differences in selling policies have a pronounced influence upon prices during periods of uncertainties. Some companies have developed efficient selling forces at considerable cost; their aim is to obtain full market price on every sale. Other companies depend upon underselling their competitors to obtain distribution; they consider the difference between their prices and the market as their selling cost. Such underselling is generally termed "chiseling"; it is, rather, an outmoded marketing method that frequently creates price war.

Unprofitable newsprint prices dominate the prices of many other grades of paper. No manufacturer finds it easy to obtain profitable prices on grades that are related to newsprint. The insignificant increase in the 1936 newsprint price was like putting salt in a wound.

Progressive lowering of tariff rates on paper by means of so-called "trade agreement treaties" is not calculated to encourage price firmness. Importations of certain grades have increased enormously, and they are sold in limited markets at prices which domestic manufacturers cannot meet.

These and other causes create uneasiness because they influence prices. They cause manufacturers to think in terms of price cutting; they undermine price

policies. Many hesitate between selling at prevailing market prices and cutting prices to obtain volume without regard to cost. Competitors watch each other closely in an effort to detect the first movement toward covering with volume. From this, uneasiness grows and confidence wanes.

And just here it should not be forgotten that in many, if not most lines, firmness or stability of price is just as advantageous to the buyer or consumer as to the manufacturer, enabling him to plan his own operation without fear of wide fluctuations which prevent fair planning of business policies.

But these are all familiar phenomena; we have experienced them many times in the past, and we have eventually overcome them by pulling together. We have learned by bitter experience that we must pull together. I venture to say that the cost to the industry of learning the lesson of cooperation has amounted to more than the profits that the industry has made in its whole history; millions upon millions of dollars in wasteful competition.

To bring this home, let us consider our recent record. In 1932 the industry was going downhill; production was declining; payrolls, employment, wage rates were moving downward swiftly and prices were leading the way and wage cuts had to follow keeping pace. Tremendous capital, material and labor resources were dissipated in bitter price competition.

Group activities were at their lowest ebb. Only two Divisional Associations functioned in a normal manner, two associations that had behind them more experience in cooperative activities than any other groups in the industry, and they did a remarkable job. Otherwise cooperative activities were almost nil. Antagonistic opinion existed on many issues. Trade customs which had stood the test of years of development and were accepted as fair to buyer and seller alike meant little. Even business ethics were affected. The picture of our industry in 1932 is indeed a sad one.

Now turn to 1934. Production was but little more than in 1932 and the burden of idle capacity was practically the same. But in spite of this the industry employed more wage-earners than ever before in its history. Its hourly wage rates were in many cases at peak levels and for the industry as a whole very little below the all-time records.

Trade customs were observed more generally than ever before. Business ethics with few exceptions were religiously upheld. In spite of the talk of chiseling, sales below market prices were relatively few. In 1934 the industry met its obligations to its wage-earners and to its consumers, and it made progress toward meeting its investor obligations.

What is the cause for this difference? Isn't the answer bound up in the one word "Confidence"? Of course we had difficulties in 1934; as a matter of fact, many conditions were worse than in 1932. But instead of pulling in different directions, in plunging into blind competition, we met frequently to discuss our problems. We supported our organizations not only with money but with our time and energy. There was a surprising willingness on the part of each manufacturer to bear his share of the sacrifice for the good of the industry, instead of letting the other fellow shoulder it all. In the long history of our industry there is no comparable record of achievement.

Uneasiness has increased since the termination of the code. Of course, there was some uneasiness during the code period; it was restlessness, rather, caused by regulation. It did not affect cooperative action. Our current brand is something else; it is threatening, I am told, the industry's willingness to pull together.

Few would like to see the NRA reestablished, for we disagree with the principle of Governmental domination of cooperative activities. Yet the fact remains that we governed ourselves better then than we are doing now. One cannot refrain from questioning our ability to govern ourselves without the aid of the Sovereign.

I doubt if we can return to the exact pre-code status of business relations, for new responsibilities have grown up, new ideas of business conduct have developed, and new realization of the far-reaching effects of unleashed competitive warfare have awakened public consciousness. It is unlikely, furthermore, that consumption increases can keep sufficiently ahead of the construction of production facilities, that the normal reactions of supply and demand will support a living price. Industry has reached the stage where it needs government, for its natural balances and checks react too slowly. The question of whether it will be self-government or an imposed government depends upon our ability now to maintain standards that permit us to meet our responsibilities. Gentlemen, we must face this issue squarely, for not only are our financial and labor resources at stake, but our freedom of action, opportunity for individual initiative, and many other privileges that American business men enjoy may be threatened.

The future of our industry lies largely in our own hands. We can move forward with profit to our workers and our investors, or we can flounder in competitive warfare. Which will be recorded in history as our choice depends upon the extent to which we can re-establish our confidence in one another this week.

If we deal fairly with our employees and with our customers, as we have done, we will have demonstrated our right and our ability to use self-government and we need not fear interference with that right.

### Central Grading Committee Report

Following Mr. Sensenbrenner's address, Ernst Mahler, chairman of the Central Grading Committee, reported on the committee's activities during the year just closed. Mr. Mahler commented upon the Instrumentation Report and emphasized the immense value of this work and its extensiveness. He stated that the committee has received many favorable comments and already one association has officially adopted one of the instruments described in the report. The patent on this instrument is to be assigned to the American Paper and Pulp Association and will become its property. This is the first time in the history of the industry that all groups have co-operated in such a venture, and the fruitfulness of this method of attack is manifest. Mr. Mahler brought out that there is material here for every mill in the industry, no matter what grade or grades of paper it may manufacture.

### Comparative Reporting Service

D. Clark Everest then rendered a report for the Comparative Reporting Service. He introduced the formal outline of his report with the following remarks:

During the past year the Secretary and his staff and members of the Executive Committee have been giving a great deal of thought to the additional service which might be rendered to the members of this Association. They were also faced with the problem of maintaining the staff under a reduced budget. Realizing that there exists today a great need for the reduction of costs through the increase in operating efficiencies if one is to remain in this business on a profitable basis, it was decided to offer to the members a Comparative Reporting Service on a contributory basis.

The plan involves making reports of conversion costs of various items, which will be enumerated later. No names are disclosed, but it gives management an opportunity to see wherein its efficiencies are lower than others and is an indicator of the items on which to work.

Comparisons of current costs with past performance in an individual plant are, of course, of vital importance, but it is infinitely more important to know how you stand in relation to your competitors.

There is no place for smug complacency in this business. Those who get the idea that they have their costs on such a basis that they need no information on outside performance are sometimes due for a rude awakening. This service is provided for those who desire to cooperate and who are willing to give their information in exchange for what they are able to get from others.

My impression is that one may benefit many times the expense of his contribution.

### Import Committee Reports

A highly interesting report on behalf of the Import Committee of the Paper Industry was given by John R. Miller, chairman of the Committee.

He said that every American Paper Manufacturer has benefited, whether he knows it or not, from the work of the Import Committee of the American Paper Industry. Most of them know something of its activities. Inasmuch as this is the twelfth anniversary of its estab-

lishment it is appropriate to review briefly its early history.

Following a conference on February 16, 1924, a Committee of five representative manufacturers was formed to determine the policies and to maintain executive leadership over the activities of the new organization. The basic policy then laid down was that the Import Committee could do its best work as an independent organization, devoted to the single task of protecting the domestic industry against unfair foreign competition, and by being in no way involved in any other problems of the paper industry.

It was felt, the speaker stated, through this policy that the entire strength of the paper industry could be devoted to an effort to secure one hundred per cent enforcement of existing tariff and other laws designed to prevent misclassification, undervaluation, and dumping of foreign paper. The Committee does not and never has touched raw materials.

During all of the past twelve years the Committee has steadfastly adhered to this original policy with such success that the Committee Members today are more than ever convinced of the wisdom of the original decision.

**Other Reports Given**

The session also heard report for the Committee on Public Affairs, by Stuart B. Copeland; a talk on the subject Manufacturer-Merchant Relations by Harold L. Zellerbach, president of the National Paper Trade Association.

In the enforced absence, due to illness, of Charles Dennison, A. E. Sawyer, of the Dennison Company, discussed manufacturer-converter relationship.

J. D. Zellerbach, chairman, presented the report of the Trade Customs Committee, and Howard Beatty reported on behalf of the American Pulpwood Association.

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## ◆ Paper Jobbers Meeting

The thirty-third annual convention of the National Paper Trade Association of the United States, whose membership comprises the leading paper jobbers and merchants of the country, was held in New York at the Waldorf-Astoria Hotel on February 17 to 20, inclusive, simultaneously with the paper manufacturers yearly gathering. This year's merchant confab was exceptionally well attended, the large number of members present representing practically every section of the country.

Officers elected for the ensuing year were headed by O. F. Marquardt, of Marquardt & Co., Inc., New York City, as president, succeeding H. L. Zellerbach, of the Zellerbach Paper Company, San Francisco, Cal. F. Bendel Tracy, of the Fort Hill Paper Company, Boston, was elected vice president in charge of the Wrapping Paper Division, and G. G. Cobean, of the J. W. Butler Paper Company, Chicago, vice president in charge of the Fine Paper Division. C. W. Vernon, of Vernon Bros. & Co., New York City, was elected treasurer, and A. H. Chamberlain, of New York City, was again chosen secretary, with C. A. Spaulding, J. H. Londergan and W. S. Hewins named assistant secretaries.

F. J. Sensenbrenner, president of the A. P. & P. A., addressed the paper merchants, bringing them the greetings and good wishes of the manufacturers association, and touching on co-operation between manufacturers and jobbers, the general industrial situation, paper prices, etc.

## ◆ N. Y. Forestry College Alumni Dinner

The dinner of the Pulp and Paper Alumni of the New York State College of Forestry, which is held annually during the week of the T. A. P. P. I. Convention, took place as usual this year at the Sacher Restaurant on Wednesday, February 19.

The faculty of the College was represented by Assistant Dean Clyde Leavitt, Prof. C. E. Libby, head of the Department of Pulp and Paper Manufacture, and by Mr. W. O. Hisey.

As usual, the meeting was entirely informal. Professors Leavitt and Libby gave short talks describing the progress being made by the College, particularly as regards the installation of the new pulp and paper laboratories. There were several other very brief and informal talks.

The dinner was well attended by alumni of virtually all classes, as follows:

*1913*—W. A. Munro, Pres., Flambeau Paper Co., Park Falls, Wis.

*1916*—C. G. Weber, National Bureau of Standards, Washington, D. C.

*1917*—W. L. Glass, Economy Filler Processes, Albany, N. Y.

*1918*—H. M. Meloney, Insurance, Douglaston, Long Island.

*1920*—Karl A. Swenning, Mead Corp., Kingsport, Tenn.

*1921*—H. E. Weston, THE PAPER INDUSTRY, Chicago, Ill.

*1923*—H. P. Cannon, Container Corp., Manayunk, Pa.; B. L. Kassing, Hammermill Paper Co., Erie, Pa.

*1925*—Mortimer Riemer, Attorney, 217 Broadway, New York; L. M. Roope, International Paper Co., New York City; W. R. Willets, Titanium Pigment Co., Brooklyn, N. Y.

*1926*—W. O. Hisey, College of Forestry, Syracuse, N. Y.

*1928*—C. L. Van Schaick, Individual Drinking Cup Co., Easton, Pa.

*1929*—J. B. Atwater, Dill and Collins, Philadelphia, Pa.; E. N. Wennberg, Continental Diamond Fibre, Bridgeport, Pa.

*1930*—H. O. George, International Business Machines Co., Endicott, N. Y.

*1931*—A. H. Andersen, Individual Drinking Cup Co., Easton, Pa.; M. E. Blew, Strathmore Paper Co., W. Springfield, Mass.; F. Casciani, Electro Bleaching Gas Co., Niagara Falls, N. Y.; E. P. McGinn, St. Regis Paper Co., Deferiet, N. Y.; H. M. Schulman, Mabrand Products Co., Long Island City, N. Y.; L. M. Sutherland, Sloane-Blabon Corp., Trenton, N. J.

*1933*—P. W. Hardesty, Brownville Board Co., Brownville, N. Y.; M. Landberge, General Dyestuff Corp., New York City.

*1934*—I. V. Earle, Individual Drinking Cup Co., Easton, Pa.; W. B. Morehouse, Lawless Bros. Paper Mills, E. Rochester, N. Y.

*1935*—A. McAneny, Bradner Smith and Co., Chicago, Ill.

## ◆ Wood Pulp Importers Meet and Elect

Edward E. Barrett, of the Mead Sales Company, Inc., New York, was elected president of the Association of American Wood Pulp Importers at the annual meeting of that group in the Waldorf-Astoria Hotel, New York, on February 6. Mr. Barrett, who previously was vice president of the Association, succeeds Nils R. Johaneson, of Johaneson, Wales & Sparre, Inc., New York, president for the last two years.

Carlton B. Overton, of Castle & Overton, Inc., was elected vice president to succeed Mr. Barrett, and Seymour Hollister, of the Mead Sales Company, Inc., was chosen secretary. J. Allan Millar, of the Perkins-Goodwin Company, New York, was re-elected treasurer. The foregoing officers, together with retiring President Johaneson, will compose the Board of Directors of the Association for the ensuing year.

As a token of their appreciation of the valuable work he performed during his two years in office, the members presented Mr. Johaneson with a handsome desk, and further tribute was paid him by a testimonial made a permanent part of the minutes and records of the Association.

## ◆ Supply Dealers Banquet

Arranged, as always, during Paper Week in New York, the twenty-eighth annual banquet of the New York Association of Dealers in Paper Mill Supplies, Inc., was held on the evening of February 19 in the East Ball Room of the Hotel Commodore, New York, with more than 200 present and including numerous paper and board mill purchasing agents and other executives who were guests of the supply merchants.

Following the serving of a sumptuous seven-course dinner, a fine stage show of 12 acts was presented on an elevated stage at one side of the spacious dining hall affording an unobstructed view to all in the room. There were talented vocalists, dancers, musicians, fun-makers and others on the program, including a novel roller skating girl trio.

Walter H. Martens, of George W. Millar & Co., Inc., and president of the Association, was chairman of the Banquet Committee which planned and conducted the affair, assisted by Joseph P. Gaccione, Julius Levine, Louis Gottlieb, Harris Goldman, Frank Valva and Arthur Rosenfeld. An attractive souvenir journal program and menu, containing the advertisements of many leading concerns in the trade, was published and distributed at the banquet.

# Twenty-First Annual Meeting of T. A. P. P. I.

ANOTHER annual meeting, the twenty-first of the Technical Association of the Pulp and Paper Industry, is now history. This meeting was held on four successive days beginning on the morning of February 17, 1936, at the Waldorf-Astoria Hotel in New York City.

The morning session of the first day was a general one presided over by Clark C. Heritage, president of the Association. To this assembled group, Mr. Heritage delivered the president's address.

**President Heritage Addresses Association**

In his remarks, Mr. Heritage stated that substantial progress was made by the industry during 1935 and that the leaders of the industry are displaying an optimistic attitude toward 1936. He called attention to the fact that capital is again being invested in new mills for both pulp and paper and suggested that regional competition is becoming more of a reality and less of a speculation. He made reference to a struggle in the making between classes of pulps and of papers, bleached sulphite versus bleached sulphate; unbleached sulphite versus bleachable or semi-bleached sulphate, and papers processed on the paper machine versus varieties processed as a converting operation.

Mention also was made by Mr. Heritage of the acceptance of devices of all sorts for indicating, recording and controlling the variables of the stock and of the paper machine; of the detailed inventory of our forest resources being made by the Forest Service; of the attention being given to the waste liquors from the pulping processes; and of several other efforts that indicate technical trends in the industry. He further stated that the annual expenditure of the Association per member approximated $28.

The special bibliographic work of Dr. C. J. West, and Mrs. Ralph Snell's gift of her late husband's collection of historical books on pulp and paper to the Association received the commendation and thanks of Mr. Heritage for the Association.

Mr. Heritage then briefly touched upon publication policy, technical committee organization, opportunities for expanding and perfecting committee work and the chartering of local sections of the Association. With these comments, Mr. Heritage concluded his address, closing with the quoted statement, "Nothing great was ever achieved without enthusiasm."

**Secretary-Treasurer Makes Annual Report**

In the annual report of R. G. Macdonald, secretary-treasurer of the Association, it was stated that the total membership of the Association on December 31, 1935, was 1,244.

Mr. Macdonald in his report likewise expressed the regret of the Association for its loss through death during 1935 of Henning Arbo, W. Ross Campbell, George R. Wyman, Alonzo B. Bradley, Amos L. Allen, Joseph H. Slater, Arthur D. Little, James L. Carey, L. F. Parmenter and Aleks Lampen.

Then, too, he commented upon the handling of special reports, listed 15 reports that were issued during 1935, mentioned the employment service of the Association to members, expressed appreciation for the successful 1935 fall meeting at Atlantic City, New Jersey, that was sponsored by the Delaware Valley Section of T.A.P.P.I., and commented briefly on publication activities—stating in this connection that the Technical Association Papers for the year reached an all-time high in size with 608 pages, and was bound in cloth for the first time.

In addition, he listed the membership of the Association in several bodies, mentioned co-operation through committees with others, named the officers of the several local sections of T.A.P.P.I. and told of the personnel changes in committee groups. His report was concluded with brief comments on the new general committee on educational co-operation—a committee made up of divisional chairmen and of which John L. Parsons of Hammermill Paper Company is chairman. The committee organized to distribute association research funds has two studies under way: one at the Institute of Paper Chemistry to determine the existence and nature of fiber membranes; and the second at the University of Maine to study the results of treating pulp in various kinds of refiners.

## Monday Sessions

The program of the general session, in addition to the president's address and the report of the secretary-treasurer, included among other things the presentation of four papers; namely, *Comparative Pulpwood Growing Capacities of Southwest Georgia and the Fog Belt of the North Pacific Coast*, by D. E. Hervey; *Preliminary Report on the Study of Existence and Nature of Pulp Membranes*, by H. F. Lewis; *A Contribution to the Mechanism of Bleaching*, by F. E. Brauns; and *The Effect of pH on the Rate of Chlorine Consumption in Bleaching*, by W. O. Hisey and C. M. Koon.

It was brought out in the paper by Mr. Hervey that the southern pine region and the hemlock-spruce region of the Pacific Northwest are probably the highest bidders for a new era of expansion within the pulp and paper industry; that in South Georgia the longleaf pine type reached its peak at 50 years, slash pine at 20 years, and loblolly at 40 years; that in the Pacific Northwest a rotation of 60 years gives maximum volumetric production, that the average acre of normally stocked forest land in Georgia Survey Unit No. 1 (ten million acres in southeast Georgia), will produce 91.02 cubic feet of pulpwood annually under normal conditions; and that the average acre of normally stocked forest in the western hemlock-sitka spruce fog belt in the Pacific Northwest will produce 211.56 cubic feet of pulpwood annually or 2.31 times as much as the average acre in Georgia Survey Unit No. 1.

*A Preliminary Report on the Study of Existence and Nature of Pulp Membranes* was next presented by Dr. H. E. Lewis as a contribution of the fundamental research committee. He also presented the paper of F. E. Brauns on *A Contribution to the Mechanism of Bleaching.*

The last paper to be presented before the general session on the morning of the first day of the convention was a joint paper by Professor W. O. Hisey and C. M. Koon on *The Effect of pH on the Rate of Chlorine Consumption in Bleaching.*

Two meetings were held simultaneously during the afternoon of the first day. One was a materials of construction meeting; the other, alkaline pulping.

Four papers were scheduled for presentation before the Materials of Construction meeting with J. D. Miller presiding.

**Materials of Construction Group**

The first of the papers was entitled, *Materials of Construction Developments*, and was the subject of Mr. Miller himself. In this paper it was stated that the introduction of ferrous alloys for sulphite mill equipment about 1929 finally resulted in the drafting of specifications for chromium-nickel-iron castings by the Technical Association; that these were adopted as an official standard on March 15, 1935; and that recently a proposed change in Note 2 concerning the use of molybdenum has been made. A questionnaire sent to sulphite pulp mills in the fall of 1935 revealed that several mills are now 100 per cent equipped with alloy steel, all non-ferrous alloys having been replaced; that no new or novel alloys are being used; and that an appreciable saving in maintenance per ton of pulp was attained by the use of alloy steel as compared to non-ferrous alloys.

Attention was called to the symposium

on materials of construction represented by papers presented before the division of Industrial and Engineering Chemistry at the 89th meeting of the American Chemical Society, and the paint symposium of the American Society of Testing Materials that was presented in March, 1935. In concluding his remarks Mr. Miller cited several articles along the line of his subject that appeared within the pages of *Industrial and Engineering Chemistry* during 1935 as well as a reference to some material in *Chemical and Metallurgical Engineering*.

**Cast Iron and Copper and Their Alloys**

The second paper scheduled for presentation before the materials of construction group was a paper by F. L. La Que on *Cast Ferrous Alloys in the Paper Industry*. In this paper a somewhat extensive tabulation of applications of cast ferrous materials in the industry was given along with a diagrammatic flow sheet of the pulp and paper making processes. This tabulation revealed that considerable use is being made of cast irons improved by the addition of such alloying elements as nickel, chromium and molybdenum in addition to ordinary cast iron. Silicon iron was listed for alum pumps, piping and valves.

The third paper scheduled for presentation before the group meeting was entitled, *Copper and the Copper Alloy Metals*. It was the subject of James T. Kemp, who stated in part that copper is the most ancient of metals known to and used by man; and that the physical properties of copper can be varied at will within limits of severe cold working on the one hand and soft annealing on the other; that other metals added to copper make a series of ductile alloys, within definite limits of composition, all stronger than copper itself, with valuable properties and, like copper, capable of being hardened by cold work or softened by annealing. He added that the brasses are alloys of copper with zinc which in wrought forms cover a range of compositions down to about 58 per cent copper. The physical properties of the brasses were said to vary with composition. Consideration also was given to other commercial alloys of copper produced in sheet, rod, wire and other wrought forms—the true bronzes with tin, the aluminum bronzes, the cupro-nickels and nickel silvers, the copper silicon type and several others of less importance. The paper also included tables of tensile properties of each group of alloys as well as data on rates of corrosion by $SO_2$, dilute sulphuric acid, salt spray, and actual sulphite mill exposure. Red brass and fourdrinier wire likewise came in for mention. It was pointed out in this connection that red brass, copper 80 to 85 per cent with balance of zinc, is used for high grade table rolls but not in quantity for other papermaking purposes; and that fourdrinier wire is made of low brass (high copper) of the 80 to 90 per cent type, or bronze of the 90 to 95 per cent type.

**Pertinent Data on Insulation**

*Insulation Specifications for the Paper Industry* was the subject of J. W. Hemphill, the last of the four papers scheduled for presentation before the materials of construction meeting.

It was suggested in this paper that some confusion seems to exist relative to terms commonly used to express the measure of effectiveness of insulating materials. To clarify this situation, the meaning of *conductivity, heat transmission* and *efficiency* was explained. In this explanation it was stated that conductivity is a measure of the rate of flow of heat through a given material; that it is generally expressed in B. t. u. per square foot per one inch of thickness, per degree temperature difference between surfaces per hour; and that it is an inherent property of the material and remains constant regardless of thickness; that heat transmission, on the other hand, is the measure of rate of heat flow from one surface through the intervening materials to the air immediately contacting the outside surface and takes into consideration surface resistance. Heat transmission, it was said, is usually expressed in B. t. u. per square foot or linear foot of pipe per degree temperature difference per hour, the rate of transmission through a thin layer of material being much greater than through a thick layer of the same material or combination of materials. Efficiency, stated Mr. Hemphill, is expressed as the per cent of heat saved by insulation over bare surface loss, and is obtained by subtracting the heat loss through the insulation from the heat loss of uninsulated surface and dividing the difference by the heat loss of the uninsulated surface.

Pipe insulation specifications for heated lines and recommendations for power plant equipment insulation as well as for some items of pulp and paper mill equipment were given. The insulation recommendations for pulp and paper mill equipment included rotary boilers, soda and sulphate digesters, unlined sulphite digesters (given in belief that unlined alloy steel sulphite digesters may be used commercially in the future), ends of paper machine dryers, de-inking equipment, paper machine hoods, and recovery apparatus for soda and sulphate mills.

Insulation recommendations and other pertinent data were covered in the paper in a series of tables and charts.

**Alkaline Pulping**

Several papers likewise were scheduled before the Alkaline Pulping meeting. They included the following: *The Chemical Nature of Dyestuffs in Pine Woodpulp*, by G. M. Kuettel, M. W. Bray and C. E. Curran; *Alkali Recovery by Electrical Precipitation*, by N. W. Sultzer and C. E. Beaver; *Rate of Digestion of Wood in Sodium Hydroxide Solutions*, by W. J. Nolan and D. W. McCready; *Distribution of Digester Heat Following the Blow*, by G. H. Tomlinson and H. K. Collinge, and *The Improved Murray-Waern System of Chemical and Waste Heat Recovery*, by F. H. Rosencrants.

It was stated in the joint paper of G. M. Kuettel, M. W. Bray and C. E. Curran on *The Chemical Nature of Dyestuffs in Pine Woodpulp*, that an investigation of the several possible sources of dyestuff in pine wood sulphate pulps has definitely linked these coloring materials to the so-called phlobotannins and their condensation or oxidation products, the phlobophenes. Other possible sources of coloring materials, such as the flavones (which are allied to and accompany certain phlobotannins), lignin and its degradation products, the possible formation of sulphur dyes in preparing the pulp, the yellowing action of alkalies or cellulose, or the iron content of the cooking liquor are shown to have only a secondary influence in producing color in pine sulphate pulps and in rendering such pulps difficult to bleach. A survey of the literature, it was stated, leads to the conclusion that the same class of substances —the phlobotannin derivatives—are also responsible for the reddening of sulphite pulps.

**Stack Loss Recovery by Electrical Precipitation**

*Alkali Recovery by Electrical Precipitation*, the second paper on the program of the Alkaline Pulping meeting and the subject of N. W. Sultzer and C. E. Beaver, outlined the principle of stack loss recovery by electrical precipitation methods and described a few applications of Cottrell electrical precipitators to soda and sulphate mill recovery units.

Tests made during the past few years at different pulp mills to determine the quantity of sodium salts lost in the stack gases from recovery furnaces, it was suggested, reveal a loss equivalent to about 110 pounds of $Na_2SO_4$ per ton for sulphate mills and about 81 pounds of $Na_2CO_3$ per ton for soda pulp mills. Then it was pointed out that the Cottrell electrical precipitation equipment has had wide application for cleaning gas and for the collection of even the most finely divided particles from the gas either wet or dry; and that some of the installations now operating in soda and sulphate mills collect the suspended material (sodium salts) as a dry powder and others collect the material wet or in solution.

Some remarks likewise were made relative to the operating characteristics of precipitators. In this connection it was mentioned that the electrical power consumption for energizing a precipitator installation averages about 8 kw. hours per million cubic feet of gas treated; that the pressure drop through a precipitator is only about ½ inch of water; that very little special labor is required for the operation of a precipitator; and that inasmuch as the precipitator is of rugged steel construction, maintenance and depreciation should be nominal—the only reason for high maintenance being excessive corrosion.

**Soda Pulping Investigation**

The joint paper by Messrs. Nolan and McCready on *Rate of Digestion of Wood in Sodium Hydroxide Solutions*, was

presented by Mr. Nolan. In this paper, the result of an experimental investigation, it was stated that the fraction of ground spruce wood from mill bolts, retained between 20 and 60 mesh screens was used in all cooks; that the capacity of each digester was one liter and that six digesters were mounted in an oil bath; that the cooking temperature was constant for each cook from the time of charging the digester until the cook was blown; and that the concentration of the cooking liquor remained practically constant because of the large volume of cooking liquor, usually more than 100 cubic centimeters per gram of wood.

The rate of digestion, it was observed, is very rapid in the first few minutes of the cooking period and decreases as the cooking process proceeds. However, under drastic cooking conditions, said Mr. Nolan, the rate of reaction is rapid to the point of complete solution of the wood. Another fact that was observed is that the rate of reaction is not greatly influenced by the concentration of the sodium hydroxide solution until cooking temperatures exceed 140 deg. C. The rate of pulping was said to approximately double for each 10 deg. C. rise in cooking temperature and for increases in concentration of the sodium hydroxide solution from 10 to 20, 20 to 40, and 40 to 80 grams per liter.

An empirical method of evaluating the rate of digestion of wood, stated Mr. Nolan, is suggested by the appearance of the cooking curves. This method was applied to data reported by such investigators as Bray; Lewis and Laughlin; Bray and Curran; Bray, Martin and Carpenter; Wells, Grabow, Staidl and Bray; and Mitchell, Potter and Ross. Calculated cooking curves in several instances, continued Mr. Nolan, closely approximate the experimental curves and in all instances the calculated curves show quantitatively the influences of the operating variables on the pulping reaction.

**Alkaline Pulping Blow Heat Study**

Much of the information contained in the paper on *The Distribution of Blow Heat in Alkaline Pulping* by Messrs. Tomlinson and Collinge was in the form of a detailed heat balance. This balance covered operations at the plant of the Canada Paper Company, Windsor Mills, P. Q., and indicated the final distribution of blow heat as follows:

| | | |
|---|---|---|
| Usefully absorbed in— | | |
| Evaporators | 30.1% | |
| Digesters | 6.6 | |
| Causticizing | 14.6 | |
| Pulp washing | 14.0 | |
| Total | | 65.3% |
| Lost— | | |
| As uncondensed steam, etc. | 11.9% | |
| In water to sewer | 11.8 | |
| By radiation from liquor system | 10.1 | |
| By radiation from blow tank | 0.9 | |
| Total | | 34.7% |

Mention was made in concluding the paper that production at Windsor Mills has been increased recently; that blow steam recovery is now somewhat less efficient than indicated by the calculations; that the system is being revamped for the purpose of meeting this condition and of avoiding some of the heat losses disclosed by the investigation; and that on completion of the change the losses should be reduced to about 15%. The additional heat recovered, it was said, will be used to supplement the pulp wash water supply of the mill.

**Soda and Sulphate Mill Recovery System**

Mr. Rosencrants in his paper on *The Improved Murray-Waern System of Chemical and Waste Heat Recovery* cited a two-unit installation at the plant of the Hummel-Ross Fibre Corporation, Hopewell, Va.; suggested that these units differed from the Murray-Waern units preceding them in the extent to which water-cooled surfaces replace the refractory walls of the smelter pot, the bottom of the pots being of refractory construction but with all side walls and connection to rotary dryer being constructed of high pressure steam generating tubes in the form of a steam boiler for producing high pressure steam and all that portion of the wall exposed to possible contact with liquid smelt or which might receive direct impingement of flame from the high pressure air nozzles being protected by bolted-on cast iron blocks which may be renewed in case of deterioration. The prime advantage of the Murray-Waern construction over older units preceding them, stated Mr. Rosencrants, lies in the elimination of man-handling of black ash from rotary to smelter pot, in the control of air supply for combustion, in the efficient recovery of waste heat, and in the fact that it cleans up the recovery room.

Essential instrument equipment with which the operator at the smelter end of the unit should be provided, according to Mr. Rosencrants, included differential gauges actuated by pitot tubes in the pipes to the high pressure air nozzles (one complete unit for each nozzle); a differential gauge, preferably of the indicating and recording type, for total gas flow through the unit; an indicator showing speed of liquor pumps; gauges for indicating draft at smelter furnace, waste-heat boiler outlet, and evaporator-scrubber outlet; steam flow meter of indicating, recording and integrating type; steam pressure gauge; feedwater pressure gauge; high pressure air supply gauge; temperature indicator and recorder for gas leaving waste heat boiler; temperature indicator and recorder for superheat; and temperature indicator and recorder for gas outlet from evaporator-scrubber. In addition, the operator should be supplied with means of controlling air supply to each of high pressure air nozzles, speed of liquor supply pump, and either the speed of the induced draft fan at evaporator-scrubber outlet or of adjusting the damper at the evaporator-scrubber outlet.

The evaporator-scrubber serves, it was stated, not only as a gas scrubber and heat absorber (reducing the temperature of the products of combustion leaving the boiler to a value between 200 and 300 deg. Fahr.) but also as an evaporator. As an evaporator it serves to raise the solid content in the liquor from a value of something under 50 to about 65 per cent, the value desired for delivery to the rotary dryer.

A steam production of 400,000 lb. per 24 hr., according to Mr. Rosencrants, has become established as a routine standard for a 50-ton unit and that this production corresponds approximately with 8000 lb. steam under actual pressure and temperature conditions per ton of pulp.

Another feature of the Alkaline Pulping group meeting was a discussion of raw materials specifications for lime and salt cake. The discussion was opened by John Traquair and resulted in several individuals taking a very active part in revealing some of the difficulties in developing standard specifications for lime. Among those that took part in the discussion was a lime producer and an executive of the National Lime Association.

With the exception of the annual luncheon on the afternoon of the last day of the convention the remainder of the sittings were as group meetings, two meetings during each of the morning and afternoon sessions.

## Tuesday Morning Sessions

The group meetings of the morning of February 18 included one on Stuff Preparation and one on Coated Paper. G. Lamont Bidwell, Jr., presided over the Stuff Preparation meeting, while J. J. O'Connor was in charge of the Coated Paper meeting.

**Stuff Preparation Group**

Four papers were scheduled for presentation before the Stuff Preparation group. They included the following: *The Thorsen-Hery Beater*, by G. W. Dodge; *The Cowles System of Detrashing and Defibering Waste Paper Stock*, by Edwin Cowles; *Production of Mechanically Defibered Pulps*, by A. S. Cosler; and *The Refining Action of Discs*, by D. Manson Sutherland, Jr.

In the first of these four papers, Mr. Dodge described the Thorsen-Hery beater and compared its power requirements and hydrating effects with the Hollander type of beater. The beater roll of this beater, Mr. Dodge stated, rotates in a direction opposite to that of all other Holland type beaters—the beater bars being presented to the incoming stock against the direction of flow. The plate area, continued Mr. Dodge, is of such quantity that in combination with the large number of bars in the roll, a large number of inch cuts per minute are developed. Added description revealed that the stock as picked up by the roll after passing the plate is thrown clear of the revolving roll by centrifugal action and delivered to the mixing chamber back of the roll.

Two other interesting features of this

beater, as mentioned in the paper, are that the beater roll turns in fixed bearings and that bed plate pressure, the bed plate being suspended at a point above the roll, is controlled by means of air pressure. The beater, in either cast iron, cast iron tile lined, concrete or concrete tile lined construction, is available in sizes ranging from 700 pounds to 2000 pounds (8 per cent consistency). Power requirement figures for the beater were shown graphically to be remarkably low.

### Defibering and Clarifying Waste Paper Stock

Mr. Cowles in his paper, *The Cowles System for Detrashing and Defibering Waste Paper Stock*, discussed the Cowles Classifiner and showed its application in a system for the clarification and defibering of waste paper stock as prepared in board mills in this country. The essential elements of the Classifiner, stated Mr. Cowles, are two circular perforated discs or screens which are clamped in a case much like the elements in a filter press. Crude stock enters through the center of the outside screen and is spun between the screens by means of a four-bladed paddle. Mounted on the paddle blades are hinged scrapers. The edges of these scrapers advance and bear directly on the surfaces of the screens, thus setting up an effective clearing action.

To operate the system stock is led to the Classifiner from the breaker beater. The accepted stock from the Classifiner is thickened. The return water from the thickeners is mixed with the rejected stock which need not be more than 10 per cent of the total, resulting in a very thin stock mixture, less than 0.5 per cent. This mixture is passed over forks in a simple device called the Cowles detrasher. The forks of the detrasher fish out stringy materials and the remaining mixture of thin rejected stock then settles. After settling, it is used to dilute the incoming stock to the Classifiner to the required consistency of 1 to 3 per cent.

Among the other points touched upon by Mr. Cowles in his paper were the following. If stock is not allowed to recycle and the consistency is kept around 1.5 per cent, especially when coarser screens ($\frac{3}{16}$ inch diameter holes) are used, there is almost no hydration or other action on the fibers; the life of screens and scrapers is generally from six weeks to six months; and the design of the Classifiner has been worked out to enable the handling of all classes of trash including heavy metal parts such as nails, small nuts, and bolts, also strings, hair, excelsior, Cellophane, rags and similar materials. It also was stated that less than 0.5 hp. is required per ton of stock handled when screening through holes between $\frac{1}{8}$ and $\frac{3}{16}$ inch in diameter.

### Factors of Refiner Disc Design

The history of disc refiners was touched upon briefly by Mr. Sutherland, Jr., in his paper on *Refining Action of Discs*, before proceeding with the more technical discussion. In this connection it was stated that among the earliest patent records on disc refiners is that of L. G. Stuart, who was granted British patent No. 2828 (November 29, 1856) covering a single rotating disc equipped with knives. The mechanics of disc design, according to Mr. Sutherland, Jr., include the following factors: impact inches or inch cuts per minute, contact area, width of bars, angle of bars, width and depth of grooves, speed of rotation, outlet diameter, width of grooves, inlet area of grooves, discharge area, amount of pulp held between discs, rate of flow between discs, amount of stuff produced per square inch of area of discs per hour, and pressure between discs.

Mr. Sutherland also commented that one disc stationary and one rotating at a given speed is much more economical on power than two discs running oppositely at the same speed. The reduction in capacity with single rotation without any reduction in work done on the fibers was said to approximate 20 per cent.

### Operating Characteristics of Double-disc Refiner

The remaining paper scheduled before the Stuff Preparation Group meeting on the morning of the second day of the convention was that of A. S. Cosler on the *Production of Mechanically Defibered Pulps*. In this paper, which was illustrated with lantern slides, Mr. Cosler emphasized the characteristics of the Bauer double-disc refiner and its application to the treatment of papermaking fibers. This machine, stated Mr. Cosler, applies a rubbing, rolling and twisting action to the fiber bundles which produces fibrous stock from raw, steamed or semi-cooked wood for use in wall board, insulating board or in nine-point corrugating. He likewise mentioned that the double disc machine pulps screenings of sulphite, kraft and groundwood so the stock can be returned directly to screens for acceptance as number one stock for news, wrapping and other grades in a totally closed system.

The distinctive feature of the machine was said to be two motors which turn two discs in opposite directions. The discs are 36 in. in diameter and are held in their relative positions by an adjusting mechanism which provides for a coarse adjustment and a micrometer adjustment of .001 inch in spacing of the disc. Springs keep the discs in position under proper tension and provide a way for the discs to spread apart to pass any foreign material that may enter with the raw material. Different types of feeders, it was stated, are used for different materials and are operated by a variable speed drive.

Six plates, made in a number of different patterns to perform different duties, compose a complete disc and are bolted to the face of each disc by slotted bolt recesses. With two 1200 r.p.m. motors, the discs have a relative velocity under load of 2300 r.p.m. The relative speed at the periphery is 361 feet per second.

Experiment has shown, commented Mr. Cosler, that inch cuts per minute are not the determining factor in this machine and cannot be used as a basis of judging what a plate will do. The distinctive action of the machine, he continued, seems dependent on two things —the rolling and twisting action that comes from the two discs and the relative high speed at which it operates. Positive and clean separation of the fibers, as revealed in numerous photomicrographs, was pointed out as apparently a result of this speed. Certain it is, Mr. Cosler said in concluding his remarks, that the rolling and rubbing action between the discs is much more effective proportionately in defibering these rigid materials than the slower motions of the single disc machine.

Among the lantern slides that were shown to illustrate the action of the machine were photomicrographs of normal news spruce groundwood, double disc refined groundwood screenings, poorly refined groundwood screenings (not double disc), poorly refined kraft screenings (not double disc), Southern pine double disc defibered—steamed 3½ hours—70 lb. pressure—1 per cent soda ash, and double disc refined semi-cooked chestnut.

### Coated Paper

After the presentation of three developments reports, one by F. W. Egan on *Coating Equipment*, a second on *Raw Materials* by O. W. Callighan and the third by H. W. Annis on *Finished Products*. J. J. O'Connor, presiding over the Coated Paper Group meeting, called upon Dr. R. F. Reed for his paper entitled *Lithography on Coated Papers*.

### Printing Difficulties with Coated Papers

Many interesting facts were brought out by Dr. Reed in his presentation. Some of them are revealed in the following résumé.

Recent developments in offset printing plates have made it possible to obtain printing density and definition by the offset process approaching that of letter press printing. The quality now obtained enables the lithographer not only to produce better printing on soft and rough-surfaced papers but to do very creditable monochrome and four-color work on super-calendered and coated papers. For reasons of quality and economy, the trend in lithography in recent years has been away from rough finishes and toward smooth-surfaced papers.

In the days of direct lithography, little difficulty was encountered in the use of coated papers from picking of the coating, setting-off, curling, wearing of the plate, and scumming, because of the low speeds and short runs. In offset lithography, with its high speeds and longer editions, these troubles increased in magnitude, and for a time coated papers fell into disfavor. However, improvements in manufacture resulting from a better understanding of the use requirements of coated papers, and improvements in technique on the part of

the lithographer, have brought about an increase in the use of coated papers in offset lithography. These difficulties still persist in some degree and further research to eliminate them is desirable.

Picking and peeling of the coating are caused by the tack or pull of the ink. Tack increases with the speed of printing and decreases slightly as the thickness of the ink film is increased, within printing limits. Coated papers which are satisfactory for direct lithography and letter press printing may therefore show a tendency to pick on the offset press. The moisture content of offset inks during printing is sometimes as high as 25 per cent, and this moisture tends to soften the coating and weaken its bond with the body stock. Methods of overcoming picking on the press involve either reduction of quality of the work or increase in the cost of printing. The logical solution of the picking problem lies in the development of dependable standardized tests for ink-paper relationships.

Setting-off of the impression is the result of impermeability of the paper and lack of quick setting properties of the ink. The problem of setting-off must be solved by research on both paper and ink, and the development of tests that can be applied both by the papermaker and the lithographer.

Curling of coated-one-side papers is directly related to two-sidedness. It is a serious lithographic problem as it causes feeder trouble and misregister in color printing. Since it is theoretically impossible to make a coated-one-side sheet that will lie flat under all atmospheric conditions, it appears necessary to design the paper for the condition under which it is to be printed.

Coated papers change their dimensions somewhat more than uncoated papers with changes in atmospheric humidity. They are, therefore, more prone to develop wavy edges than uncoated papers and cause register troubles on this account. To overcome this handicap there must be greater precision in the conditioning of coated papers.

Coated papers sometimes cause "scumming" and "wearing" of the printing plates. These difficulties may be due either to excessive alkali in the coating or to the presence of soluble materials that tend to reverse the water-in-ink emulsion that normally exists during printing. Alkalinity can be determined by pH measurements of the cold-water extract of the paper, and if excessive alkalinity is shown, its effects on the plate may be obviated by increasing the acidity of the fountain water on the press. The presence of soluble polar substances that tend to reverse the water-in-ink emulsion can be detected by a foam test on the cold-water extract.

**Pebble Mill Characteristics Outlined**

*Using a Pebble Mill* was the title of the next paper which was presented by S. J. Dickhaut. The pebble mill, discussed by Mr. Dickhaut, is the product of Paul O. Abbé; is of all-steel construction; is lined with burr stone or high-grade porcelain; has a capacity of 175 cubic feet; and operates continuously at 25 r.p.m. for 45 minutes. A 20 hp. motor is used for the drive—the horsepower requirements dropping to about 15 hp. after a few minutes of operation. The casein charge is made up on a basis of one pound of casein to four pounds of water. This mill, stated Mr. Dickhaut, replaces eight old style mixers that took four hours to complete a batch.

At this point, a brief discussion on the use of ball mill on dry colors ensued, it being reiterated that such a mill gives very fine division of color particles and increases tinting effects. The discussion was followed by a paper by H. L. Bullock on *The Colloid Mill in the Paper Industry.*

**Colloid Mills and Color Jordan Described**

Mr. Bullock told of some of the early pioneering difficulties; stated that the colloid mill was an English development; and suggested that the Premier Liquid Mill, the pioneer mill, was developed in England at about the same time that the Plausen attrition-type mill was developed in Germany. The patents covering the Premier Mill, continued Mr. Bullock, were purchased subsequently by the Nester Brothers of Geneva, N. Y., and the Premier Mill Corporation formed to develop and manufacture the mill in this country.

Four schools of colloid mill designers were mentioned. One specialized on horizontal shaft construction using a fluted cone rotor and stator. Another developed the flat plate type mill with horizontal shaft construction and with either one or both plates rotating. A third combined the horizontal construction with smooth rotor and stator of the Premier patents; while the fourth designer utilized a fluted rotor and stator in a vertical mill.

The principle of action of the Premier colloid mill was explained—the mill being either for liquid or paste. All paste type Premier mills, stated Mr. Bullock, have the feed from the top while the feed is from the bottom in the liquid mill. Jacketed construction of Premier mills also was emphasized as a feature that permitted high melting point materials to be kept fluid by heating, or materials sensitive to heat may be cooled during processing.

The colloid mill, in the opinion of Mr. Bullock, has many important applications in the paper industry since it can be used to produce emulsions, dispersions, and for the grinding of coating materials and pigments. He said that at least twenty paper companies are already using colloid equipment; that the groundwork has been laid for the paper coating trade; and that leading colloid mill manufacturers, with their modern laboratory equipment, stand ready to co-operate on other specific and related problems.

Another paper, *Dispersion of a Coating Mix*, was the subject of George A. Oechsle. This paper, read by H. C. Schwalbe, presented data on the Lancaster disperser, the Eppenbach colloid mill, and also on the Crane color jordan.

The Lancaster disperser, made only in one size at present, was stated to have a capacity of 150 gallons per hour, and, operating at 3600 r.p.m., to require 5½ hp. The unit has an overall length of 31 in., width of 9 in. and height of 17½ in. Two rotors, operating in a cylinder, throw coating color introduced at the bottom of the rotors outward against stator blades. The coating color, pressed into a header on the top of the machine, is then passed to a short screening device. The machine, operating on the principles of extreme turbulence and velocity, was said to produce a smooth, homogenous coating color which brushes out quite easily. On color coatings it was stated that a saving of dyestuff can be made, one mill reporting a saving of from 7 to 10 per cent; and another 14.3 per cent on an expensive color and 4 per cent on a cheaper color.

The Eppenbach colloid mill, different from the Lancaster disperser, is made in several sizes. One size, however, size C, was intimated as being the unit usually found in coating color work. This unit, handling from 20 to 500 gallons per hour and requiring a 5 hp. motor, has an overall length of 17 in., a width of 17 in. and a height of 50 in. The grinding chamber includes a standard method of rotors and stators, the rotors being equipped with vanes for directing the coating against the side walls of the stators, with clearances set to grind and crush hard particles and reduce the coating color to the smallest possible particle size. Among the advantages, cited by Mr. Oechsle for the Eppenbach mill, are ease in cleaning, water cooling jacket, saving in color pigments, positive control of color, and ease of operation.

The Crane color jordan, made in one size and requiring ½ hp. motor operating at 750 r.p.m., has an overall height of 36 in., length of 28 in. and width of 10 in. This mill is of the horizontal type; is cadmium plated inside; and is equipped with a galvanized outside hood. Its capacity was given as 250 gallons per hour.

The application for the color jordan in several mills was cited. This citation included one mill where it was located between agitators and screens, two mills between screen or screens and coating machine color backs, and one for general purposes. One coating mill, according to Mr. Oechsle, liked the results obtained with it on dark sheets and also on copper, silver, and gold coatings. Another mill is using it in the mixing of casein with very good results. A saving of pulp colors, elimination of spots and pin holes, reduction in viscosity, and reduction in particle size—particularly in the use of calcium carbonate, were among some of the advantages cited for the Crane color jordan by the several mills.

## Tuesday Afternoon Meetings

The group meetings of the afternoon session of February 18 included a continuation of the Coated Paper meeting with J. J. O'Connor presiding, and a

Stuff Preparation and Mechanical Pulping meeting over which F. C. Clark and M. P. Chaplin presided.

Much of the afternoon was taken by the coated paper meeting in open discussion of the subjects covered by the papers of the morning. As in the case of the morning session, representatives of several of the different items of equipment described were in attendance and gave to those interested the benefit of their knowledge and experience.

**Coated Paper Meeting Continued**

The program also included the presentation of several papers, one by title on *Surface Treatment of Paper on the Fourdrinier Machine*, by Elizabeth Hunter, a second on *The Retention of Pigments in Paper*, by J. H. Haslam and F. A. Steele, and a third by W. R. Willets on *Effect of Beating and Pigmentation on Sheet Properties*. Another subject on the schedule involved the consideration of raw materials specifications for casein.

It was brought out in the joint paper by Messrs. Haslam and Steele that most of the pigment retained in most cases of commercial paper where there is a circulation of white water must be retained by cofloculation, since the pigment retained by mechanical attachment (the only pigment retention that can be directly measured) amounts to 30 per cent or less of the total retention, and since only an insignificant fraction can be retained by filtration under ordinary conditions. The paper also covered the experimental procedure that was employed in making the findings which have been indicated.

The paper by Mr. Willets on *Effect of Beating and Pigmentation on Sheet Properties* likewise covered a laboratory investigation. This investigation, made on the beating and pigmentation of domestic bleached sulphite stock with titanium dioxide, revealed that beating increases retention of titanium dioxide; that it results in increased strength and decreased opacity; that the decrease in opacity caused by beating is greatest in unpigmented paper; that the loss in strength resulting from pigmentation to secure a given opacity of a beaten stock is much less than the gain in strength resulting from beating; and that, since only small amounts of titanium dioxide are needed to obtain given opacity results, the ash content is not greatly increased and consequently the strength is not affected to any great extent. The general procedure followed in the investigation was explained within the paper in some detail and some consideration also given to a discussion of the results.

**Stuff Preparation and Mechanical Pulping**

The papers scheduled before the Stuff Preparation and Mechanical Pulping meeting included *Proposed Methods of Computing Impact and Contact Inches in Beaters and Refiners*, by G. Lamont Bidwell, Jr., and D. Manson Sutherland, Jr.; *Report on Stuff-Preparation Committee and Mechanical Pulping Committee Study of Refiners*, by M. P. Chaplin; *Grinding Pulp with Great Northern Grinders*, by G. K. Walker; and *Occurrence of Compression Wood in Black Spruce and Its Effect on the Properties of Groundwood Pulp*, by M. Y. Pillow, E. R. Schafer and J. C. Pew.

**Some Committee Activities Reviewed**

The paper by Messrs. Bidwell and Sutherland representing a preliminary report of the stuff preparation committee on the collection of design data from equipment manufacturers, brought out the fact that practically every beater and refiner has different tackle, the tackle varying widely with length of bars, width of bars, number of bars, arrangement of bars, width of spaces or cells, depth of spaces or cells, angle of shear, and speed. It also suggested the use of such terms as impact inches, impact inches per minute, contact inches, and contact inches per minute. Each of the terms were defined and a method given for the calculation of each of them. A correlation of beater and refiner design with stuff properties, capacities and power consumption, in the opinion of the contributors, are badly needed by equipment manufacturers and paper mill operators in order to improve upon present practice.

Mr. Chaplin pointed out in the presentation of his report that the early work of the year of the mechanical pulping committee was combined with that of the stuff preparation committee in the form of a questionnaire sent to all manufacturers of pulp preparation and refining equipment. This procedure, it was stated, was followed to avoid the sending of two sets of similar questions to firms by two T.A.P.P.I. committees. From the replies to the questionnaire, the mechanical pulping committee selected such as had to do with mechanical pulping and refining and are carrying on its investigation from that point.

An investigation on the refining of groundwood screenings is now actively under way, the detail work being carried on at the University of Maine under the direction of Paul D. Bray, Professor of Pulp and Paper Technology. This work includes the tabulation of data concerning the various types of machines and equipment, and an examination of the samples of refined pulp produced by these machines at various mills. In the case of newsprint mills, samples of unrefined pulp, refined pulp and composite pulp which includes the pulp from the grinders plus the refined rejects are examined. Samples of the news sheet are also secured for comparison with laboratory test sheets.

In addition to the usual tests made by the laboratory, pulp fractionation tests will be made on all pulp samples. This work has been made possible by a grant of T.A.P.P.I. funds for the purchase of a four-stage Appleton screen and the other necessary equipment. Acknowledgment was made by Mr. Chaplin of the co-operation and assistance of the Appleton Machine Company, which made it possible to secure the equipment with the fund available, and to the W. S. Tyler Company for supplying the screens gratis.

The screen as furnished the University of Maine was equipped with 24, 32, 60 and 150-mesh screens, but the University has found it desirable to use 24, 50, 90 and 200. The Forest Products Laboratory at Madison, Wis., recommends 24, 42, 80 and 150, while the Laboratory at Montreal suggests 28, 48, 100 and 200 for its particular type of screen. One mill user suggests 25, 35, 50 and 150-mesh screens for the flat plate screen, either single or multiple stage.

Mr. Chaplin also stated that experiments at the University indicated that better results could be secured with much less operating difficulty when 50 grams of pulp at a consistency of .01 per cent is used as contrasted to 100 grams of pulp diluted to approximately .002 per cent consistency.

**Reducing Groundwood Production Costs**

After mentioning earlier personal experiences in the production and use of groundwood pulp, George K. Walker in his paper on *Grinding Pulp with Great Northern Grinders* proceeded to give the results of recent experience in the use of the Great Northern grinders installed in the mill of Finch, Pruyn & Co., Glen Falls, N. Y. He said in part that paper making troubles began and paper production went down in the old days when the groundwood maker was told to make a little more pulp (thus cutting down on the sulphite content of the paper) and given only a handful of cast iron sectional burrs to sharpen his stones; that the Hall process, introduced in 1916, convinced some pulp makers that there were possibilities of a radical improvement in the methods of making groundwood pulp; and that the manufacture of groundwood today is a more scientific process than it was a few years back.

Mr. Walker then compared Finch, Pruyn grinder plant operation in 1933 with today. He stated that in 1933 the mill operated 29 three-pocket grinders and employed eighteen men in the grinder room. In 1934, he continued, eight Great Northern grinders were installed and more recently a laboratory. The stones, running at 220 r.p.m. and controlled by Meyer governors under a pressure of 52 pounds, manufacture approximately 20 tons of pulp per day at 55 to 60 hp. per ton. These stones are artificial—Carborundum and Norton. The burring cycle of all stones for the last three months operations have averaged 117 hours between sharpenings as contrasted to the old method of burring each stone once every eight hours. Stone wear approximates 1/16 inch per month and stone cost is about 6½ cents per ton.

After sharpening each stone, remarked Mr. Walker, a sample of pulp is taken to the laboratory and a sheet made and tested for strength and freeness, thus permitting the production of more uniform pulp. In his opinion, best results will be obtained in burring with a No. 2 spiral burr with 1½ inch lead and a

No. 12 diamond burr with a Norton stone 60 N and a Carborundum 56 running 220 r.p.m. with a pressure of 30 pounds per square inch of grinding surface with a temperature from 140 to 160 deg. Fahr. and consistencies of 3.5 to 4 per cent. Temperature and consistency of stock in grinder pit, commented Mr. Walker, have a large influence on the strength of the pulp.

The grinders, equipped with Taylor temperature controls, require an operating crew of four men per tour instead of eighteen as required by the old set up.

**Groundwood Pulp Research**

Following some interesting discussion of Mr. Walker's paper in which William G. MacNaughton of the Pulp and Paper Laboratory of Industrial Committee of Savannah, and William Brydges of the Bedford Pulp and Paper Company took part, C. E. Curran presented the joint paper of Messrs. Pillow, Shafer and Pew on *Occurrence of Compression Wood in Black Spruce and Its Effect on the Properties of Groundwood Pulp*. This paper, the result of an investigation at the Forest Products Laboratory, Madison, Wis., indicates that the presence of compression wood has a deleterious effect on the properties of groundwood pulp and should be taken into consideration in the manufacture of certain specialized products. The experimental grinder runs showed that pulpwood containing large amounts of compression wood produces larger amounts of small fiber fragments than does wood relatively free from compression wood. If the wood is ground when green, fewer of the very fine fragments are produced than if ground after about one year's seasoning. Pulp made from compression wood is lower in strength than that made from normal wood. Although the fiber length is only one of the factors upon which the strength of groundwood is dependent, the comparable conditions under which the experimental pulps were produced, it was stated, indicates that the proportions of fine and coarse fiber fragments in these pulps are largely responsible for their strength characteristics.

It also was pointed out that compression wood is readily recognized with a little experience; that it may be reduced in quantity or eliminated entirely by sorting logs in the woods or at the mill; and that it may also be reduced to a minimum by selecting wood prior to felling from stands where it is least abundant.

Another paper, likewise the result of investigative work at the Forest Products Laboratory, Madison, Wis., was scheduled for presentation by title before this stuff preparation and mechanical pulp meeting. The paper was a joint paper by E. R. Shafer, J. C. Pew and R. G. Knechtzes and was entitled *Effect of High Pit Temperature and Preheating the Wood on the Grinding of Loblolly Pine.*

## Wednesday Morning Sessions

Five papers were scheduled for presentation before the Heat and Power group meeting, one of the two group meetings on the morning of the third day of the convention and over which A. G. Darling presided. These papers were: *The Rate of Drying Writing Paper*, by F. W. Adams; *The Rate of Drying of Glassine and Grease-proof Paper*, by V. F. Waters; *Drying Rates for Tissue and Absorbent Papers*, by A. E. Montgomery; *Control of Moisture Content in Paper Undergoing the Process of Progressive Drying*, by J. A. Sheehan; and *Comparative Head Losses in Various Kinds of Pipe When Stock of Certain Kinds and Consistencies Are Being Pumped*, by S. B. Jones.

**Heat and Power Meeting**

The first of these papers to be presented was that of Mr. Waters on *The Rate of Drying of Glassine and Greaseproof Paper*. This paper, based on a survey made by the subcommittee of T.A.P.P.I. on Drying, Heating and Ventilating, was presented by A. E. Montgomery.

Reference was made in the paper to the equations of Montgomery for drying rates of kraft paper and used by Adams for drying rates of newsprint. These equations, when applied to glassine and greaseproof, give rates that are lower than those for kraft and newsprint. The figures also show that the rates vary more widely than for the classes of papers studied previously. The average of all data submitted indicated approximately 2.4 pounds of water evaporated per pound of paper dried with the weight of the sheet, in the opinion of Mr. Waters, having little or no effect on the production drying rate.

Three charts were used to illustrate the paper. One shows the effect of steam pressure or corresponding steam temperature on the production drying rate. A second indicates the evaporation drying rate and the third shows data plotted to indicate any effect which the weight of the sheet might have on both the production and evaporation drying weights.

**Writing Paper Drying Characteristics**

Professor Adams in his paper on *The Rate of Drying of Writing Papers* stated that dryer performance in the production of writing papers were studied by means of operating data obtained from questionnaires; that the results were calculated to a uniform basis through the use of several simple formulae (the same formulae suggested in the preceding paper—editor's note); and that the results indicate that machines operating at higher steam temperatures, due to carrying higher steam pressures in the dryers, show a much greater production based on area of drying surface and a larger capacity for evaporating water. It likewise was brought out that production and evaporation are not entirely a question of removing water at the maximum rate but that these factors are profoundly affected by the shrinkage characteristics of the sheet. The result in a general way were said to indicate that where higher drying rates are permissible, a large increase in capacity is available with a relatively small increase in steam pressure. These rates for writings, however, it was stated, fall considerably below those for most other grades.

**Tissue and Absorbent Paper Drying**

It was brought out in the paper by Mr. Montgomery on *Drying Rate for Tissue and Absorbent Papers* that the drying rates for tissue and absorbent papers are lower than for kraft paper or news; that the drying weight on Yankee dryers is about four or five times as high as for other dryers; and that the weight of the sheet has a decided effect upon the moisture content of the sheet entering the dryers, most particularly on the lightest weights.

Four graphic charts were used to present the findings. One chart shows the production drying rate plotted against steam pressure; the second shows evaporation drying rates expressed in pounds of water evaporated per hour per square foot of drying surface; the third shows drying rate on Yankee dryers; and the fourth shows the effect of basis weight on drying weights and the effect of basis weight on moisture in sheet entering dryers.

**Paper Drying Control**

The paper by Mr. Sheehan on *The Control of Moisture Content in Paper Undergoing the Process of Progressive Drying* described a method of moisture determination in paper during its manufacture and a means to control it. The method of moisture determination consisted of taking temperature readings of the sheet as it passed over the dryers through the use of portable thermocouples which had hot junctions that were shielded from external influences and compensated cold junctions. Simultaneous with the taking of temperature readings, samples were cut from the sheet, placed in air-tight jars, and moisture determinations made upon them in the conventional manner.

The tests indicated that the amount of moisture contained in the paper has a definite relationship to the sheet-temperature after its sub-critical point is reached, a relationship based on the behavior of water in the presence of heat and which follows definite physical laws. They showed that the temperature rises rapidly during the beginning of the drying operation at which time heat is supplied to the water in the sheet to raise it to the boiling point under the prevailing vapor-pressure; that during this rise in temperature, moisture leaves the surfaces of the paper at a rate proportionate to the differential of pressure between the vapor in the sheet and that of the atmosphere in contact with it; that following the rapid rise, the temperature remains stationary for a considerable period of time because the boiling point has been reached and because the rate of heat-flow from the sheet nearly equals the supply; that as drying progresses beyond the critical temperature of the sheet, moisture continues to be evaporated from it but at a diminishing rate because of the increased re-

sistance to the flow of heat into and from the paper resulting in higher internal temperature; and that for a particular drying operation the prevailing temperature represents a quantitative measurement of the moisture content in the product under consideration.

Mr. Sheehan previous to describing a means of controlling the drying operation called attention to such drying variables as basis weight, initial moisture content, freeness, speed of sheet, bulk, heat supply, and atmospheric conditions; and said that a moisture control system to be successful must instantly evaluate the effect of all of these influences. He also stated that with an ideal control the temperature should be held within limits of one-half of one degree Fahr. plus and minus of the desired setting and this should correspond to approximately two-tenths of one per cent moisture content.

Then, in his description of a control, he said that the sheet temperature must be measured first by a sensitive electric thermometer having an extremely small heat capacity; that the temperature impulse thus obtained must be communicated to a steam-flow control unit which acts to maintain a ratio between the flow of steam into the dryers and the moisture content of the sheet; that the control action must not be throttled or limited, but must operate over the full range of steam supply so that it immediately compensates for normal changes in basis weight, machine speed, etc., without requiring manual adjustment; that it must be free from "hunting" or "cycling;" and that it must be extremely sensitive and fast.

Mr. Sheehan likewise called attention to the need in some cases of producing papers with a low final moisture content which he said could be obtained safely provided the sheet temperature is under control. With a few additional remarks, suggesting the useful purposes of curves such as were charted and used to illustrate his presentation, Mr. Sheehan concluded his paper.

### Pipe Friction Loss Study

The paper presented by S. B. Jones on *Comparative Head Losses in Various Kinds of Pipe When Unbeaten Pulp of Certain Kinds and Consistencies Are Being Pumped* was a paper prepared jointly by Dr. H. E. Fritz and himself and covered test results obtained in studying the flow of ordinary soda pulp and soda pine pulp (which was said to have characteristics somewhat similar to sulphite) through some sections of test pipe of several different materials arranged in series so that at any instant the same quantity of the same material would be flowing through all pipes at any one time. In describing the test layout, Mr. Jones said that all test pipe sections were laid parallel and as near together as could be done conveniently on a level platform so that no account need be taken of the difference in elevation between the ends of any test section; that a differential manometer was installed for each test section, all the manometers being arranged side by side so that readings in head loss across each section could be made most rapidly; that the distribution line from the last test section of the series, in order that all the pipes should always run full, was directed upward into a tank; that uniform taps for manometer connections were obtained by using steel pipe for all approach and departure connections of a size chosen to give as near as possible the same internal diameter as the test section to which it was connected; that none of the test pipes were over 8 inches I.D.: that all approach and departure pipes were made straight and 10 feet long; and that the end of the departure pipe from one section was connected by a return bend with the approach pipe of the next succeeding section.

The general test layout and the results of the test were graphically illustrated with lantern slides. One slide revealed that the test layout included rubber lined steel pipe, copper pipe, wood pipe, and galvanized steel pipe—all of the piping being new. The other slides included a chart of curves showing the head loss in pounds per 100 feet of pipe per pound of oven dry soda pulp being transmitted per minute (pulp being measured); a chart of curves showing comparative head loss in pounds per 100 feet of pipe conveying soda pine pulp, the pulp being recirculated; and a third chart of curves showing comparative head loss in pounds per 100 feet of pipe conveying soda pulp, the pulp being recirculated. No critical analysis of the curves was made by Mr. Jones, but when questioned about final pipe selection he intimated that the selection was made from the information revealed by them.

### Paper Testing Group

A Paper Testing Group meeting with B. W. Scribner presiding was held simultaneously with the heat and power meeting. At this meeting, Mr. Scribner presented his *Progress Report of Paper Testing Committee for 1935-6.*

In this report, Mr. Scribner stated P. W. Codwise and his subcommittee on water resistance completed a study of the method proposed by Miss R. M. Cobb at the last annual meeting for measuring the water resistance of areas of paper and paperboards adjacent to their surfaces; that E. S. Worth's subcommittee on water vapor permeability has made considerable study of the multitude of testing procedures and apparatus that have been proposed for testing this property; that there is still insufficient information on the testing of air permeability for committee standardization of this important test; that B. L. Wehmhoff has obtained some additional information relative to testing the printing properties of papers, work that he had to discontinue because of change in position; that the activities of James d'A. Clark's subcommittee on physical testing comprised methods for thickness, bulk, tensile strength, bursting strength, stretch, dirt and stiffness; that a tentative revision of the standard method for opacity was adopted by the committee; that J. B. Calkin, chairman of the subcommittee on microscopical methods, completed a proposed revision of the standard method for fiber composition of paper; that tentative standard methods for soluble iron and arsenic and a tentative revision of the standard for the amount of mineral coating were adopted by the association; that proposed methods for amount of zinc and titanium pigments and revisions of the methods for the amounts of resin and active sulphur were completed and are ready for vote on adoption; and that other activities of the subcommittee on chemical methods of which P. F. Wehmer is chairman, include the revision of the quantitative starch method to specify saliva as the conversion reagent instead of acid because the latter gives figures that are too high, and the consideration of a new standard, termed "microchemical methods for determination of alpha cellulose, copper number and acidity," for use when the test sample is very small. Members of the committee, added Mr. Scribner, are assisting in the revision of the paper testing section of *The Manufacture of Pulp and Paper*—Volume V.

### Physical Testing Methods Analyzed

*Some Observations on Burst, Tensile and Stretch Tests* was the subject of James d'A. Clark, the second paper on the program for presentation. In this paper, Mr. Clark suggested, when considering the results of some burst tests, that unless a specification is drafted to cover the inertia or other qualities of the gauge used, very large errors may be encountered. He called attention to difference in results of co-operative burst tests made by the leading laboratories in the United States and Canada. Mention also was made of the present T.A.P.P.I. method for testing tensile and stretch and co-operative test results were tabulated. As a result of gathering this data, Mr. Clark stated, it is recommended that for good results, the strip be 180 mm. long, 15 mm. wide and that the time to break the strip be from 10 to 30 seconds, but for precise work the time should be as near to 20 seconds as practicable if there is doubt about the effect of speed. In concluding his paper, Mr. Clark commented that there can be no question as to the value of agreed International standard methods as long as pulp and paper remain articles of international commerce.

The next paper scheduled before the paper testing group meeting was entitled *Studies of Tensile and Bursting Tests.* It was a joint paper by Roger C. Griffin and Russell W. McKinley, and was presented by Mr. McKinley.

Mr. McKinley stated that the Paper Testing Committee of T.A.P.P.I. has under consideration certain revisions of methods for determining tensile strength and bursting strength of paper. In order to compare results obtained by present methods with those obtained by the proposed procedure, it was added, that a series of tests were made on a number of papers of rather widely different types —medium weight kraft wrapping, heavy weight kraft wrapping, manila folder

stock, blotter, newsprint (unprinted), lightweight manifold, and heavy manila folder. The results obtained in the making of both the tensile and Mullen tests were tabulated and it was pointed out that for nearly all purposes the present method of making tensile strength determinations should insure sufficiently reliable results. The suggestion was made, however, that the method require the recording for each break of the time in seconds from the application of the load until the break occurs. In the case of the Mullen tests, the statement was made that the proposed modification gives more consistent results and the advisability of adopting it for precise work was suggested.

More information on tensile strength and stretch, and bursting strength was presented before the meeting in a paper by F. T. Carson on *Some Notes on the Revision of Methods for Measuring the Strength of Paper*. This paper, presented by G. G. Weber, discussed the dimensions of specimen for tensile strength and stretch determinations. In this connection it stated that the evidence seems clear that the limits for length of specimen afforded by the present official method are much too liberal and that the lengths between clamps should be fixed at some definite convenient value, such as 100 mm. or 180 mm.—if metric units are to be used.

The rate of testing for tensile and stretch likewise received extensive consideration and the feeling expressed that if the rate of testing is defined in the simpler manner in terms of the rate of loading, the standard method is more likely to be used and adhered to than if it is defined as recommended in the proposed revision.

The elongation of paper is a property of paper, according to Mr. Carson, that deserves more consideration than is commonly accorded it. At the same time, he suggests that until we have a method that merits greater confidence, it would probably be best to place the available method in the newly created category of suggested methods of T.A.P.P.I.

The official standard for determining the bursting strength of paper, commented Mr. Carson, has for several years been in need of revision. In his opinion, the revision now proposed only partially corrects the deficiencies. Among his added comments were the statements that the official standard specifies that pressure shall be applied at a uniform rate; that no bursting tester of the hydraulic type is ever operated in that manner; that the official method does not specify the rate of applying the load in the calibration of the gauges; that the slowing down of the bursting test, as recommended in the proposed revision, is probably a desirable change; and that in the proposed revision it is unnecessary to specify the depth of tool marks in the clamping surfaces, since grooved surfaces are not superior to substantially plane surfaces in holding the paper from slipping.

*The Nature and Measurement of Paper Acidity*, by B. L. Browning and R. W. Ulm, was the subject of the last formal paper scheduled on the program for presentation before the Paper Testing Group meeting. Another paper, *Qualifications and Training for Microscopy in the Paper Industry*, a paper by John Graff, was presented by title.

**Research on Paper Acidity**

In the paper by Messrs. Browning and Ulm it was stated that the presence of acids in papers has been attributed to acids derived from acid materials used in the preparation of the fiber material, either residual cooking acids or hydrochloric acid arising from residual bleach; acid due to alum in rosin size; acid due to treatment in finishing with acid substances, some glues, for example; acid due to alum in the tub size; acids due to degradation of the cellulose during aging and extraction; and acid due to carboxyl groups of other carbohydrates present. It was also pointed out that two types of methods for determining the acidity of paper are in general use, the total acidity by titration and the measurement of the hydrogen ion concentration in the water extract. The historical background of both of these methods was covered, numerous literature references being cited. This was followed by an extensive discussion of experimental materials and methods and results of an investigation directed chiefly toward a study of certain variables in the extraction process and toward the development of an understanding of the factors involved.

The results of the investigation indicated that the water-paper ratio and the time of extraction specified in the T.A.P.P.I tentative standard method for determination of hydrogen ion concentration in water extracts of paper are satisfactory for the papers investigated; that the temperature of extraction should be controlled more closely than 95 to 100 deg. C., a maximum allowable variation of 1 deg. C. being suggested; that carbon dioxide which is present in ordinary distilled water did not cause appreciable error in papers having a value of 6.0 pH and below; that cut samples are preferred to disintegrated samples; that the pH value of successive extracts rises very slowly, that salts such as potassium chloride added to the extraction media cause a slight increase in acid appearing in the abstract; that the prediction of the pH of paper from the pH of the stock and the white water depends upon the relative proportions of alum, size and pulp present and upon the similarity of conditions in the formation of the paper and in the water extraction; and that there is need for further work on the nature of acids present and on their relative effects in the use requirements of paper.

The literature citations of the paper totaled twenty-five references.

## Wednesday Afternoon Sessions

The group meetings of the afternoon of the third day included a Color, Containers and Graphic Arts session, and a Paper and Pulp Testing session.

A. W. Nickerson, J. L. Parsons and W. M. Shoemaker presided over the Color, Containers and Graphic Arts meeting, while R. G. Griffin and H. W. Morgan were scheduled to preside over the Paper and Pulp Testing meeting.

**Color, Containers and Graphic Arts**

The first paper presented before the Color, Containers and Graphic Arts meeting was entitled, *The Paper Industry and the Business Cycle*, and was the subject of Louis T. Stevenson. Mr. Stevenson stated in part that deductive reasoning points to the conclusion that the production of paper as a raw material for consumer goods, part of which are luxuries, should move in the same direction and at the same time with industrial production but not to the same extent in depressed periods; that this conclusion is borne out by a statistical study; that no theory entirely satisfactory for forecasting the business cycle has yet been developed; and that a suggested empirical method for determining the current phase of the business cycle should be used cautiously and with full knowledge of its limitations. The paper by Mr. Stevenson included fifteen literature citations.

**Paper Whiteness Observations**

Dr. Deane B. Judd presented the second paper of the afternoon before this meeting. His paper, entitled *A Method for Determining Whiteness of Paper*, referred to a former paper by himself on the same subject in which a definition of whiteness, based on the degree of approach to the appearance of an ideal perfectly reflecting, perfectly diffusing surface, was proposed. Further reference to the same paper indicated that magnesium oxide also was proposed as a working standard white. Through co-operation with the color committee of T.A.P.P.I, continued Dr. Judd, a set of 30 papers was collected and their degree of whiteness determined in two ways—first, by the proposed method using magnesium oxide as the standard white; and second, by direct visual judgment of 14 experienced observers. The visual results, said Dr. Judd, were obtained through the co-operation of John L. Parsons, Miss Helen U. Kiely, B. W. Scribner and W. R. Willoughby. He likewise stated that analysis of the results corroborates the general principle of the definition but suggests that magnesium oxide is acceptable as a standard white to only about half of the observers, the remainder seemingly basing their judgments on a standard which is slightly greenish yellow compared to magnesium oxide; that this color is called a "good natural white" by which is meant the color of a well bleached pulp to which no dye has been added, and that the definition of whiteness can be written around either standard with equal convenience.

**Opinions of a Paper User**

Following the presentation of Dr. Judd's paper, Mr. Nickerson called upon Charles F. Clarkson, chairman of the Graphic Arts Committee, to introduce John F. Vance of *Fortune*, the well-

known class magazine, as the next speaker on the program.

Mr. Vance looked at the paper industry through the eyes of a printer and publisher. He said that no printing job is better than its poorest element and that what he wants is a paper ideally adapted to the job he wants it to do. He depicted facetiously a one-act play of "Trouble in the Press Room"; brought into the act very realistically the paper man, the ink representative and the engraver, and then listed a few "don'ts" for the paper manufacturer in his approach to a customer. This list included such don'ts as—Do not insist that blue white is best color for his paper; that S. C. is better than E. F. for gravure; that green paper will not print; and above all do not tell customer what he wants before you know what he wants to do.

In concluding his remarks, Mr. Vance outlined a procedure to be followed by a publisher who is about to issue a new magazine that is to be largely pictorial. He stressed the need of obtaining complete information; of consulting the paper man, the ink maker, the engraver, and the printer and for determining the printability of at least a half dozen papers as well as the handling of all other problems before making specifications; and then to make sure that the specifications will hold together under stresses.

The remaining program as outlined for the Color, Containers and Graphic Arts meeting included a paper by W. T. Marble on *Combining Problems;* a presentation of *Plans for T.A.P.P.I. Work on Containers and Paper Bags*, by A. W. Nickerson, R. M. Bates and Pierre Drewsen; and some remarks on *The American Management Association Packaging Show*, by J. D. Malcolmson.

### Paper and Pulp Testing Meeting

Seven papers were scheduled for presentation before the Paper and Pulp Testing group meeting, one of them by title. The paper, scheduled for presentation by title, was a joint paper by D. T. Jackson and J. L. Parsons on *A Universal Hydrogen Ion Indicator.*

The other papers with their respective contributors were as follows: *Factors Affecting the Determination of Water Vapor Permeability*, by Allen Abrams and George J. Brabender; *Water Resistance of Paper*, by P. W. Codwise; *Further Notes on the Kollergang Beating Methods for Pulp Evaluation*, by James d'A. Clark and R. S. von Hazmburg; *Testing Wood Pulp for Moisture*, by F. W. Brainerd; *Pulp Testing by a Rapid Sheet Making Process*, by James Coghill; and *A Study of Some Variables in the Sheet Making Operation*, by F. C. Peterson and F. G. Barber.

### Water Vapor Permeability and Water Resistance

The joint paper by Messrs. Abrams and Brabender on *Factors Affecting the Determination of Water Vapor Permeability* was presented by Mr. Abrams. With a literature citation of fourteen references, this paper discloses that the permeability of sheet materials to water vapor is influenced by the vapor pressure differential on the two sides of test sheet; that it is unsafe to make assumptions, in the absence of definite measurements, as to what this differential may be; that water vapor permeability is inversely proportional to the distance between test sheet and the water surface in testing equipment; that an initial seasoning period is necessary before a constant rate of water vapor transmission is established, this being a matter of minutes with light, permeable papers or perhaps a matter of days with heavy, moisture-proof sheets; and that at the present time it appears simplest to use an empirical method and equipment which will give results predicting what a sheet will do under service conditions. Among the points that it was suggested to be observed are standardization of dimensions, lightness, prevention of edge leakage, ratio of test sheet area to water area and the distance between the water surface and the test sample.

The paper by Mr. Codwise on *Water Resistance of Paper* mentioned that the previous work of the water resistance committee of T.A.P.P.I. has been concerned with testing water penetration through the entire thickness of the sheet, or, as it is often called, the overall size resistance of both paper and paperboard; stated that this work resulted in the preparation of a standard T.A.P.P.I. method for determining this property; and suggested that it has been the object of more recent committee work to go somewhat deeper into the problem and to determine whether methods can be established which will distinguish between the sizing characteristics in different portions of the sheet and assign numerical values to these characteristics.

The Cobb test, a method of testing penetration to various depths below the surface serving as a basis of the more recent co-operative work of the committee, was described in detail and test results from six different laboratories, expressed in grams absorbed per 100 sq. cm. of surface tested, were given for solid manila, ledger, kraft wrapper, and patent coated news.

Mr. Codwise continued that it is our recommendation that the Cobb test be developed and adopted as a standard method to supplement the present one, the new procedure being for the investigation of penetration into surfaces, near surfaces, and to distinguish between sizing characteristics in different portions of the depth of the sheet. A suitable method, stated Mr. Codwise, still remains to be developed that is particularly applicable to distinguishing variations in the writing qualities of the sheet and specifically to measure the rate of lateral spreading in sized surfaces.

### Pulp Evaluation with Kollergang

*Further Notes on the Kollergang Beating Method for Pulp Evaluation*, by James d'A. Clark and R. S. von Hazmburg, covered the results of further experimental work with the Clark kollergang. In this work, unbeaten stocks for two bonds, a ledger and a glassine paper were treated by the kollergang and compared with similar stocks actually processed in the mills. A very satisfactory similarity in the beating action, it was stated, is demonstrated. The identity of action of eight different instruments is shown and also results from five different laboratories on the same pulp. It was brought out that the effect of temperature on sheet making appears to be more important than was first appreciated. Slight modifications to the method as originally proposed likewise were suggested. Mr. Clark presented the paper.

### Wood Pulp Moisture Determination Study

Mr. Brainerd followed Mr. Clark with his paper on *Testing Wood Pulp for Moisture.* Mr. Brainerd stated in his paper that several lots of baled dry sulphite were sampled by both the disc method (T210m) and the modified wedge method (British); that the disc method was found to give results from 0.31 per cent to 0.53 per cent higher than the other; that moisture distribution studies on a number of bales of dry sulphite and moist groundwood showed the moisture content of the sulphite to be higher and of the groundwood to be lower at the center than at the top and edges of the bales; and that moisture tests made at one-inch intervals through more than fifty bales of five brands of dry sulphite showed the centers to be wetter than any part of the bale within three inches or less of the top with only one exception.

Suggestions for improving the disc method of sampling were made, and a method proposed for reconciling the differences between the disc and wedge methods.

### Equipment for Sheet Making

James Cogbill in his paper, *Pulp Testing by a Rapid Sheet Making Process*, analyzed possible uses of test sheets and set up the requirements for an adequate test sheet making process and equipment. The possible uses that were cited for test sheets were: for evaluation of pulps used as raw materials, for control of processes, for record of processes, for selection of furnish, and for analysis of mechanical treatment and chemical processes. A complete apparatus for the making of such sheets was described. The apparatus consisted of 1 scales cabinet and scales, 1 hot plate, 1 proportioner, 1 sheet mold, 1 press, 1 dryer, 1 stock measure, 1 stock pitcher, 8 forming wires, 1 slowness timer, 2 press felts, 1 acid box and tongs, and 1 bench upon which the preceding units are mounted, including piping, valves, wiring, switches and circuit breakers. Mr. Coghill said that practical experience with this apparatus and the test method recommended for its use indicates that no particularly high grade of intelligence or technique is required; and that any person who can make reliable bursting and tearing tests on commercial paper can master the operations within two hours time and obtain reproducible results.

### Useful pH Indicator

The last paper scheduled for formal presentation before the Paper and Pulp Testing meeting was that of F. C. Peterson and F. G. Barber on *A Study of Some Variables in the Sheet Making Operation.* The paper by D. T. Jackson and J. L. Parsons on *A Universal Hydrogen Ion Indicator*, and which was presented by title, discussed briefly the hydrogen ion indicator of Yamada which was described in Japanese patent 99,664 [*Chemical Abstracts*, 28,2258 (April 20, 1934)]. In commenting upon the indicator, it was stated that it has been found to be very useful in a pulp and paper mill over a pH range of 4 to 10 where an accuracy of 0.5 to 1 pH Unit is desirable.

## Thursday Sessions

The meetings of the last day began with a brief business session at which officers for 1936 were elected.

### Officers Elected

A slate of officers, presented by George K. Spence, chairman of the nominating committee, named by Mr. Heritage at the opening session of the convention, was elected unanimously. The officers, as elected, include: President, Grellet N. Collins, Stevens & Thompson Paper Company; Vice-President, William R. Mauli, Dill & Collins, Inc.; Secretary-Treasurer, R. G. Macdonald, 122 East 42d Street, New York; and G. W. E. Nicholson of Southern Kraft Corporation, W. H. Swanson of Kimberly-Clark Corporation, Roger C. Griffin of A. D. Little, Inc., and M. H. Teaze of Hardy S. Ferguson as members of the executive committee. The membership of the executive committee, in addition to the names mentioned, includes: Grellet N. Collins; William R. Mauli; H. R. Murdock, Champion Paper & Fibre Company; Helen U. Kiely, American Writing Paper Co., Inc.; A. E. H. Fair, Alliance Paper Mills, Ltd.; W. J. Lawrence, Paper Makers Chemical Corporation; Albert Bankus, Crown-Willamette Paper Co.; and R. G. Macdonald.

Following the election of officers, the remainder of the morning was given over to two group meetings, one on Fundamental Research, presided over by H. F. Lewis, and the other on Heat and Power, conducted by M. H. Teaze.

Four papers were scheduled for presentation before each of the two meetings. The four papers scheduled for the group meeting on Fundamental Research were: *Invert Sugar as a Plasticizer in Paper*, by N. R. Pike; *A Survey of Pitch Troubles in the Manufacture of Sulphite Pulp*, by Otto Kress and L. A. Moss; *The Chemistry of Lignin*, by Walter M. Fuchs; and *The Origin and Development of Cultivated Plants*, by A. B. Stout. The papers before the Heat and Power group included: *Application of Diesel Engines to the Paper Industry*, by T. A. Burdick; *Proper Feed-Water and Boiler-Water Conditioning for High Pressure Boilers*, by E. W. Butzler; *Mechanical Design of Electrical Machinery*, by C. H. Koch; and *The Characteristics of Power Requirements for Paper Machines*, by H. W. Rogers.

### Fundamental Research Group

The Paper by Mr. Pike on *Invert Sugar as a Plasticizer in Paper*, outlined current practice regarding the use of invert sugar as a plasticizing agent and compared its effectiveness with that of glycerine. Comparing the moisture retention of paper containing invert sugar with that of paper containing glycerine, said Mr. Pike, we find that the two samples hold comparable amounts of moisture at humidities up to approximately 50 per cent and that in the higher ranges considerably more moisture is absorbed by the glycerine treated sheets. The largest users of plasticizer in the paper industry, he continued, have been, and possibly always will be, the makers of glassine and wrapping stock for waxing. Another class of paper products where plasticizers are widely used, he said, is found in the coating and glazing industry.

In considering the application of plasticizer to paper, he said, probably the best method in the case of glassine is to apply the plasticizing solution to the sheet while it still contains considerable moisture and to distribute the plasticizer and squeeze it into the sheet by means of a size press. Other methods of applying plasticizer to glassine that were mentioned included the application of the solution to the dry sheet by means of various dampening machines on the market, by means of a kiss roll, or by passing the semi-dry sheet through a size tub containing the solution and followed by squeeze rolls to remove the excess liquid. In the case of fine paper, it was stated that the best and most practical method of applying the invert sugar is to incorporate the plasticizer with the prepared surface size and apply it during the tub sizing operation, or, on papers which are beater sized only, it is possible to add the plasticizer in the form of a dilute aqueous solution by means of a size press or size tub. Beater application of invert sugar was said to be impractical.

In concluding his remarks, Mr. Pike mentioned that the whole subject of plasticizer in paper is still in its infancy; that new types of paper in which plasticizers play an indispensable part are being developed constantly; that new methods of applying softening agents are being discovered; and that new types of plasticizers are being examined and applied to papers which have never before been so treated.

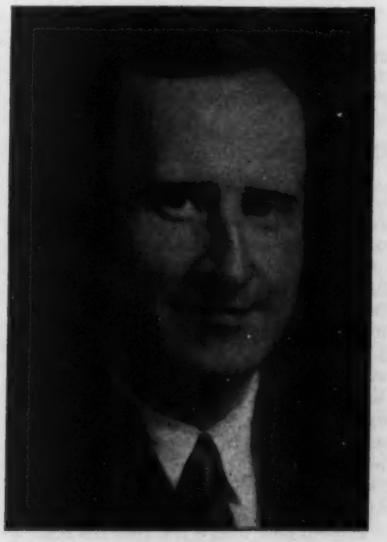
### Sulphite Pitch Troubles

The joint paper by Dr. Kress and Mr. Moss on *A Survey of Pitch Troubles in the Manufacture and Use of Sulphite Pulp* included a bibliography of 103 lit-

*Photos courtesy Blank & Stoller, Inc.*

**Grellet N. Collins**
**Newly Elected President**

**Clark C. Heritage**
**Retiring President**



**R. G. Macdonald**
**Secretary-Treasurer**

erature citations. In fact, one of the purposes of the study was to make a critical survey of the literature relating to pitch trouble and the remedies. A second purpose was to develop a pitchy pulp in the laboratory which will behave in the laboratory in a manner similar to the behavior of pitchy pulp in the mill. A third and final purpose of the work was to make a critical study in the laboratory of such tests for pitchy pulps and remedies for the alleviation of pitch troubles as have been outlined in the literature, using as pitchy pulp the material prepared in the laboratory in connection with this study.

It was found that when alcoholic solutions of natural spruce resin were mixed with water or pulp suspensions, the resin dispersed uniformly as very fine particles and exhibited colloidal phenomena characteristic for sulphite pitch in paper mill stock. This means, therefore, was used to prepare pitchy pulp for laboratory investigation. As a result of the investigation, the conclusion was reached that of the remedies which have been proposed in the literature, Braun's proposal seems to be the closest approach to a real solution of pitch trouble, he having developed a process, consisting of properly adjusted additions of waste sulphite liquor and alum to the slush stock, which is being applied successfully in one of the Canadian mills.

**Lignin Review**

Dr. Walter M. Fuchs in his paper on *The Chemical Nature of Lignin* also cited a number of bibliographical references, and stated in part that lignin is distinguished as a characteristic constituent of plants; and that the evolutionary development of plants led to variations in the nature of the constituent lignin of different plants. He likewise commented on the principal existing theories regarding the chemical composition of lignin, gave some formulae, and explained the relationship of lignin chemistry to commercial pulping processes.

The last paper scheduled on the program of the Fundamental Research group meeting was that of Dr. A. B. Stout on *The Origin and Development of Cultivated Plants.*

**Heat and Power (Second Session)**

Mr. Burdick in his paper on *Application of Diesel Engines to the Paper Industry*, the first of the papers scheduled for presentation before the Heat and Power meeting, suggested that the field of application for Diesel engines in the paper industry is probably limited to those situations in which primary power is needed, although 1 to 2 pounds of steam per kilowatt hour may be generated from waste heat in the engine exhaust by means of exhaust gas boilers, and a certain amount of low grade heat may be recovered from the jacket water. He likewise mentioned that where the amount of prime power required is considerable and where the relative cost of Diesel fuel as compared to boiler fuel is not too unfavorable that power from Diesel engines is likely to be more economical and more satisfactory than power from any other source. Diesel engine characteristics were touched upon, and some information given concerning plant layout and plant cost.

**High Pressure Boiler Water Considerations**

It was brought out in the paper by Mr. Butzler on *Proper Feed-Water and Boiler-Water Conditioning for High Pressure Boilers* that the trend for the past fifteen years has been to higher steam pressures; that the necessity for scale-free evaporative surfaces for the successful operation of the modern boiler is apparent when the effects of the higher pressures and ratings on the tube temperature are considered; that ratings of 200 or 250 per cent were once considered high but today ratings corresponding to 500 to 700 per cent are not uncommon; that for the successful operation of the modern boiler, it is just as important to protect the boiler metal from corrosion, as it is to prevent the formation of scale on evaporative surfaces; that the first step in the removal of oxygen from feed water is mechanical de-aeration; that the prevention of corrosion due to oxygen may be obtained by conditioning the water with a chemical that will fix the oxygen; that approximately 8 pounds of anhydrous sodium sulphite is required to combine with one pound of oxygen; that boiler metal cracking is attributed to simultaneous chemical action and stress, especially cyclic stress; that at the present time the only recognized basis for inhibiting cracking in riveted seams is maintenance of the ratios between the sodium sulphate and total alkalinity recommended in the A. S. M. E. Boiler Code; and that carry-over of boiler water with the steam is generally attributed to either priming, foaming, or a combination of the two.

To maintain a high-pressure, high-rating boiler in service day after day, and month after month, continued Mr. Butzler, requires a system of boiler-water conditioning in which adequate attention is given to each of the problems involved. The first factor, he said, that must be considered is the raw water; the second, the pretreatment of the raw water. He mentioned the lime-soda process and the zeolite process as the two most commonly used methods of pretreatment. In further commenting on de-aeration, he advised that the removal of oxygen from water by chemical means should not be considered as a substitute for mechanical de-aeration, but rather as a secondary line of defense following de-aerating equipment. With proper choice of pretreatment for the make-up water, he concluded, boiler alkalinity can be maintained within low, closely controlled limits.

Electrical subjects came in for consideration in the remaining two papers read before the Heat and Power meeting.

**Mechanical Design Problems**

The first of these two papers, *Mechanical Design of Electrical Machinery*, by C. J. Koch, dealt with the arrangement of such mechanical parts of rotating electrical machinery as are most important from an operating point of view. Motor ventilation and bearings were the two major design features discussed. Mention was made of open, splash proof totally enclosed, and totally enclosed fan cooled construction as well as closed circuit and pipe ventilation. Fan ventilation also was touched upon. The design features of both sleeve type and anti-friction type bearings were characterized. In the discussion of sleeve type bearings, consideration was given to waste or wick fed bearings, ring lubricated bearings, water cooled bearings and pressure lubricated bearings. The mechanical design problems involved in the use of anti-friction bearings were said to center around the choice of the type to be used and upon the design of housing.

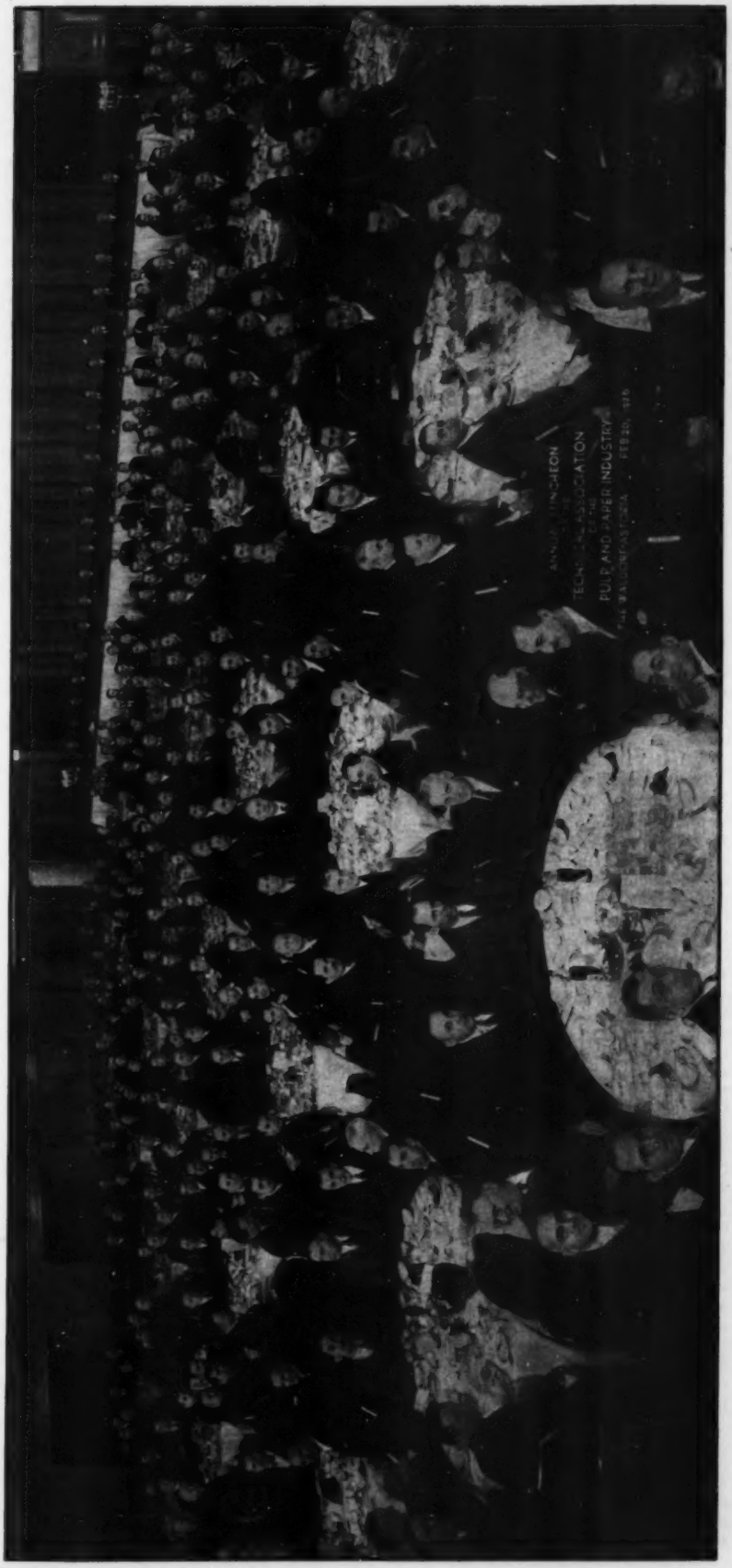
**Paper Machine Power Characteristics**

Mr. Rogers in his paper, *The Characteristics of Power Requirements for Paper Machines*, presented an analysis of the power requirements of the various parts of the paper machine of various widths and speeds and commented on the influence of such variables as suction box, vacuum, water in dryers, and torque. He stated in part that the actual friction load of a properly aligned couch or wire section unit is very low, approximately 0.00014 hp. per inch width per foot speed; that average readings of power requirements of presses indicate about 0.000225 hp. per inch width per foot speed; that the dryers constitute the only heavy inertia section; that the presence of water in the dryers even in small quantities causes enormous increases in power demand; that readings of power requirements indicate that a normal dryer requires 0.000018 hp. per inch width per foot speed per individual dryer; that the calender section does not have a constant torque requirement but differs from the couch in that its maximum requirement is at low speeds on heavy weight papers and it decreases as the speed increases; that the power constant for the calender section is determined from the maximum weight of paper to be manufactured rather than from the number of rolls or the speed in feet per minute; that the reel is somewhat akin to the calender in that its power requirement also is determined from the weight of the paper; and that the power requirements of the winder depend to a large extent upon the weight of paper and the tension in the sheet and are subject to rather wide variation. Several charts were used to illustrate the paper.

## Luncheon Meeting

A fitting climax to a successful convention was the luncheon of the afternoon that closed the twenty-first annual meeting of the Association. This luncheon, held in the Grand Ball Room of the Waldorf-Astoria, was unusually well-attended.

Retiring-President Heritage, acting as



toastmaster, early in the course of the luncheon introduced "Oscar of the Waldorf," who cordially welcomed every one. He said that it had been his privilege for more than a quarter of a century to make all who come to the Waldorf comfortable and happy. He cherished the desire of being able to do it for some time to come; asked that the Waldorf be kept always in mind; and concluded his remarks with the hope that we, speaking of the hotel organization, have done everything possible to make the meeting a success.

Mr. Heritage, previous to any other introductions, also welcomed every one to the annual luncheon, suggesting that it was the concluding event of the 21st annual meeting. He said that T.A.P.P.I. had now come of age not only in years, but in its service to members and to the industry. He commented on the days of the convention as being four days of instruction and enjoyment in both the nature of technology and good fellowship. Then he announced the election of Mr. Collins and Mr. Maull to the presidency and vice-presidency, respectively, and called upon Mr. Collins for remarks.

The new president thanked the Association for the honor it had bestowed upon him; contrasted the present size of the organization with that of its early days when each member was personally acquainted with every other member; asserted that personal contacts made with other men of the industry was one of the great values of the association; invited each individual member to show a personal interest in the work this coming year; and predicted that he would consider his job well done if his administration were as good as the past.

Leslie G. Cottrell of London, England, then was introduced. He expressed his gratitude for the way he had been welcomed and received here, both at the meeting and at different mills; congratulated T.A.P.P.I. for such a wonderful gathering; and extended an invitation to the meeting next month of the Technical Section in England.

Following these remarks, Charles Champion, President of the American Pulp and Paper Mill Superintendents Association was introduced. He expressed his pleasure at representing the Superintendents Association at the luncheon and cordially invited all members of T.A.P.P.I. to attend the Association's next national convention, which is to be held on June 24, 25 and 26, 1936, at Grand Rapids, Mich.

Greetings of the Canadian Pulp and Paper Association were extended by its president, R. A. McInnis, general manager of Anglo-Canadian. Mr. McInnis further stated that he was interested in the continually improving papers that are read before the meetings of T.A.P.P.I. and the Technical Section of the Canadian Pulp and Paper Association and in the discussions which follow.

The next comments were from F. J. Sensenbrenner, president of the American Paper and Pulp Association and of the Kimberly-Clark Corporation. Mr.

Sensenbrenner extended the best wishes of his association for continued success of T.A.P.P.I. in promoting progress in the industry; recalled the early organization of T.A.P.P.I.; expressed amazement at the growth of the Association; quoted some statistics of major industries showing progress made during 1935, and said that he would risk his reputation to predict that progress toward recovery is going to continue during 1936 and that this progress would be as great as that during 1935.

**T.A.P.P.I. Medal Presented to Wm. H. Millspaugh**

The presentation of the T.A.P.P.I. gold medal to William H. Millspaugh was next in order, the presentation being made for the association by W. G. MacNaughton.

Mr. MacNaughton in his presentation remarks called attention to the previous awards—William H. Mason, Ogden Minton, Ernst Mahler, and Edwin Sutermeister; reviewed briefly the contributions to the industry of each of these men; commented on the increasing coordination of sawmills and pulp mills in this country and to the discovery that southern pines under heartwood age are readily prepared by the sulphite process; referred to periodic attempts to use the waste of annual crops for paper; said that the development of fiber insulation —Beaverboard, Insulite, Celotex and Masonite—was worthy of mention in a review of technical progress; touched upon the development and application of the continuous barking drum; mentioned the study on grinding wood for pulp that was made in 1912 by the Forest Products Laboratory; and called attention to a number of developments in the manufacture of chemical pulp, including the introduction of the sulphate process in the United States, improvements in equipment for burning sulphur and in acid absorption systems, development of automatic sulphite digester operation through application of control instruments, chemical recovery and heat conservation developments in manufacture of soda and sulphate pulp, replacement of bleaching powder with liquid chlorine for the bleaching process, development of high density bleaching, and more recently multi-stage bleaching, and the combining of direct chlorination with calcium or sodium hypochlorite bleach and washing between the different stages.

With these facts as a background, Mr. MacNaughton proceeded to enumerate the marked advances in papermaking and particularly with reference to the paper machine, mentioning the increase in width and speed of the fourdrinier, the invention of the removable fourdrinier, and the development of stock consistency controller and metering and proportioning system and also the continuous return to the system of the fiber and fines of the white water.

Reference was then made to the introduction of the Millspaugh suction roll with its ability to increase the speed and to make heavier papers on the fourdrinier without crushing and to lengthen wire life by decreasing the wear of the wire on the flat boxes. Other operating aids to speed and continuity of operation that were mentioned were high stock inlet, carrier ropes, and air system for web transfer.

A later development of Mr. Millspaugh's that likewise came in for mention was the vacuum forming paper making machine.

William H. Millspaugh, who was presented with T.A.P.P.I. medal

These remarks were followed by the formal presentation of the T.A.P.P.I. medal to Mr. Millspaugh who, after expressing his appreciation for the honor bestowed upon him, told of his introduction to the pulp and paper industry and made brief mention of his future plans. In retrospect, he told of his first meeting of such men as George Knowlton, Clarence Kinne, G. H. P. Gould, Tom Warren, Fred Richards, Fred Parks, and others; and said that he was impelled to mention a number of papermakers who were always gracious and helpful. In this list of papermakers were the names of John Warren, George Whiting, Harry Mead, George Mead, Harry Gould, Hugh Chisholm, Philip Dodge, George Harvey, Frank Smith, Peter Thomson, Jim Harris, O. Bache-Wiig, Frederick C. Clarke, George Bardeen, Samuel W. Simpson, David Luke, Arthur Hastings, Mike Argy, Frank Hodge, Noah Bryant, George Bidwell, Clark Everest, and Frank Boston. Howard Parker, an early manufacturer of suction rolls, he said, was one of his earliest acquaintances in New England. "C. S. Hammersley, one of my dearest and perhaps most helpful friend," continued Mr. Millspaugh, "gave me the first opportunity for commercial trial of the suction roll with rotary pump."

Mr. Millspaugh, after mentioning the establishment of his business in England, said that he visualizes paper machine assemblies simpler and more efficient than those in present use and that he is keenly interested in further development of the production of steel by the centrifugal processes started at Sandusky.

**"Tomorrow's Money" Luncheon Speaker's Subject**

After reading a radiogram of greetings from the Technical Section of the Paper Makers Association of Great Britain and Ireland that was signed by Herbert Reed and Patrick McCarthy, toastmaster Heritage introduced Frank E. Gannett, president of the Gannett Newspapers, Rochester, N. Y., who concluded the program of the afternoon with a talk on *Tomorrow's Money*.

At the outset, Mr. Gannett stated that he was interested in T.A.P.P.I. and in the paper industry since there could be no permanent records without paper. Then he delved immediately into his subject, mentioning on several different occasions the book, *Tomorrow's Money*, by Frank A. Vanderlip. Gold, said Mr. Gannett, is a commodity just as woodpulp is a commodity. He asserted that all the gold in the world could be retained in a 30-foot cube; that its value changes; and that when it is less valuable, prices rise.

The depression, remarked Mr. Gannett, was not an act of God, but was man-made because of our ignorance about money. He expressed amazement at the prosperity of Great Britain; contrasted conditions there with conditions in France, Holland and Switzerland; stated that the plan used by Great Britain put an end to deflation and prevents inflation; and queried, "Why haven't we the wisdom to profit by Great Britain's experience?"

With another urge to read Mr. Vanderlip's book, Mr. Gannett concluded his very helpful talk on a subject of momentous importance to everyone.

This talk brought to a close another helpful annual meeting of the Technical Association of the Pulp and Paper Industry.

◆ ◆

## ◆ Machinery Manufacturers Meeting

The National Association of Manufacturers of Paper and Pulp Machinery and Equipment held its annual meeting in New York on February 18 in connection with the convention of the American Paper and Pulp Association. Phillips Dennett, of the Bird Machine Company, was re-elected president, and the other officers also were re-elected. Charles L. Bauer, of Bauer Bros., was again named vice president; W. B. Wilshusen, of the Cameron Machine Company, was chosen treasurer, and John Cornell was again elected secretary.

There was a fair attendance at the meeting, and various matters were discussed.

◆ THE CLARK TRUCTRACTOR CO., Battle Creek, Michigan, manufacturers of gas-powered industrial trucks, tructiers, and tractors for material-handling operations, announces that Harry B. Clapp has joined its staff as Transportation Engineer.

# Groups Hold Interesting Sessions and Elect Officers

◆ **The United States Pulp Producers Association** held a well-attended annual meeting, and an air of enthusiasm and confidence regarding manufacturing and marketing conditions and outlook pervaded the gathering. Stuart B. Copeland, of the Eastern Manufacturing Company, was elected president for the ensuing year; Amor Hollingsworth, of the Penobscot Chemical Fibre Company, vice president, and O. M. Porter, of New York, secretary-treasurer. President Copeland, Vice President Hollingsworth, and Ossian Anderson of the Puget Sound Pulp & Timber Company; Norman Brown, of The Brown Company; J. M. Conway, of the Hoberg Paper and Fibre Company; Earl McCourt, of the Consolidated Water Power & Paper Company; J. R. S. McLernon, of the Rainier Pulp & Paper Company; A. H. Showwalter, of the Mount Tom Sulphite Pulp Company; Norman W. Wilson, of the Hammermill Paper Company, and R. B. Wolf, of the Weyerhaeuser Timber Company, Pulp Division, were chosen to compose the Association's Executive Committee for 1936.

### Cardboard Manufacturers Ass'n

Kendall Wyman, of the Champion Paper & Fibre Company, was elected president of the Cardboard Manufacturers Association at the annual session of that group, succeeding Lowell Emerson, of the Rhode Island Cardboard Company. Mr. Wyman previously had been vice president. John B. Van Horn, of the Holyoke Card & Paper Company, was named vice president, and these officers, together with the following, were elected to serve on the Executive Committee for the coming year: Donald V. Lowe, of the Lowe Paper Company; Joseph A. Moses, Fallulah Paper Company; F. C. Heinritz, Appleton Coated Paper Company, and Herman R. Harrigan, District of Columbia Paper Mfg. Company.

### Groundwood Paper Manufacturers

C. H. Sage, of the Kimberly-Clark Corporation, was again chosen president to serve for the second year of the Groundwood Paper Manufacturers Association at the annual meeting of that group. Samuel Pruyn, of Finch, Pruyn & Co., was elected eastern vice president; J. H. Coy, Flambeau Paper Company, western vice president; R. E. Canfield, executive vice president, and Dr. E. O. Merchant, of New York City, secretary and treasurer. The three first foregoing officers and E. G. Murray, St. Regis Paper Company; Walter Shorter, International Paper Company; Aubrey Crabtree, Fraser Industries, Inc.; L. L. Alsted, Combined Locks Paper Company; George H. Fay, Escanaba Paper Company, and H. O. Nichols, Crown Willamette Paper Company, compose the Board of Governors for 1936. Discussion of the work of color standardization, the Association's major activity during the past year, featured the annual meeting. The Association recently published a book which calls attention to 200 standard colors with a color grading program. Statistics gathered by the Association during the past year showed that by taking 600,000 tons as the peak production figure, the industry operated to 65.9 per cent of capacity in 1934, and 73.6 per cent in 1935.

### Blotting Paper Manufacturers

Officers of the Blotting Paper Manufacturers Association were re-elected for the ensuing year at the annual meeting of that organization. D. A. Smith, of the District of Columbia Paper Mfg. Company, Washington, D. C., of which he is vice president, treasurer and general manager, was again chosen chairman of the Blotting Association, and Henry Mead, president of the Wrenn Paper Company, Middletown, O., was re-elected vice chairman. These two officers and James Ryland, vice president of the Standard Paper Mfg. Company, Richmond, Va., compose the Executive Committee for 1936.

### Writing Paper Manufacturers

The Writing Paper Manufacturers Association held its seventy-fifth annual meeting during Paper Week in New York, with a large percentage of the membership in attendance. Those at the meeting spoke encouragingly concerning prevailing market conditions and the outlook. President I. N. Esleeck, of the Esleeck Manufacturing Company, Turners Falls, Mass., was re-elected for the ensuing year, and R. S. Madden, of the American Writing Paper Company, Inc., Holyoke, Mass., was elected vice president. Emmet Hay Naylor, long secretary and treasurer of the Association, was elected executive secretary, and Morris C. Dobrow was named assistant secretary and treasurer.

The Executive Committee for 1936 consists of President Isleeck, Vice President Madden, H. R. Baldwin, Hammermill Paper Company; Norman Bardeen, Lee Paper Company; D. K. Brown, Neenah Paper Company; H. H. Hanson, W. C. Hamilton & Sons; Henry F. Harrison, West Virginia Pulp & Paper Company; G. P. Lee, Eastern Manufacturing Company; H. A. Legge, Howard Paper Company; Horace A. Moses, Strathmore Paper Company, and F. H. Savage, International Paper Company.

### Kraft Paper Association

With representatives of mills constituting approximately 85 per cent of the industry's productive capacity present, the annual meeting of the Kraft Paper Association proved an enthusiastic affair, and re-elected L. C. Anderson, of the Sorg Paper Company, Middletown, O., president for another year, and J. L. Stille, of the Southern Kraft Corporation, vice president. S. M. Hudson, of New York City, was named secretary. Executive Committee members chosen were: One year terms, Joseph Auchter, Nekoosa-Edwards Paper Company; J. D. Zellerbach, Crown-Willamette Paper Company; Willard Henry, Southern Advance Bag & Paper Company; H. W. Ellerson, Albemarle Paper Mfg. Company, and C. P. McMillen, St. Regis Paper Company. Two-year terms, J. R. Miller, West Virginia Pulp & Paper Company; M. L. Cody, Bogalusa Paper Company; W. L. Andrews, Nashua River Paper Company; C. W. Smith, Central Paper Company, and H. S. Daniels, Union Bag & Paper Corporation. The Association recently amended its by-laws to provide further rotation of members of the Executive Committee and also to give the necessary continuity to the Committee. Thus, half the members were elected to the Committee for only a single year so that their terms will expire next year and thereby put into motion the plan of having half the Committee elected each year.

The annual meeting was devoted largely to planning a program for 1936 activities. President Anderson submitted a report indicating that very gratifying progress had been made during the past year in furthering constructive cooperation within the kraft paper industry, following which the Association unanimously endorsed a program aiming for further development of this work during 1936.

### Sulphate Pulp and Board

At the annual meeting of the American Sulphate Pulp and Board Association, H. W. Ellerson, of the Albemarle-Chesapeake Company, Inc., West Point, Va., was elected president for the ensuing year, and S. M. Phelan, of the West Virginia Pulp and Paper Company, was elected vice president. Messrs. Ellerson and Phelan and H. L. Brown, Brown Paper Mill Company; Richard J. Cullen, International Paper Company; D. Clark Everest, Ontonagon Fibre Corporation; J. P. Hummel, Hummel-Ross Fibre Corporation; J. D. Zellerbach, National Paper Products Company, and A. C. Goodyear, Bogalusa Paper Company, compose the Executive Committee for 1936. S. M. Hudson, of New York City, continues as secretary and treasurer.

### Sulphite Paper Manufacturers

Rufus L. Sisson, Jr., of the Racquette River Paper Company, Potsdam, N. Y., was re-elected general chairman of the Sulphite Paper Manufacturers Associa-

tion at the annual meeting of that organization, held following individual meetings of the several groups in the Association. George Stuhr, Continental Paper & Bag Corporation, was re-elected vice chairman of the Unbleached Division; Rufus I. Worrell, Mead Sales Company, Inc., was elected vice chairman of the Bleached Division; Edgar W. Kiefer, Port Huron Sulphite & Paper Company, was again chosen vice chairman in charge of the M. G. Sulphite Division, and W. M. Benzing, Champion Paper & Fibre Company, was elected vice chairman of the Manila Division, succeeding Walter B. Merlin, Hollingsworth & Whitney Company. The Board of Governors for 1936 consists of John E. Alexander, Nekoosa Edwards Paper Company, and Walter B. Merlin, Hollingsworth & Whitney Company, re-elected, and the following newly chosen members: John Stevens, Jr., Marathon Paper Mills; William A. Cohen, Elk Paper Mfg. Company; Richard A. McDonald, Crown Willamette Paper Company, and Aubrey Crabtree, Fraser Industries, Inc.

**American Waxed Paper Ass'n**

The American Waxed Paper Association held meetings in the forenoon and afternoon on the first two days of the convention, with each of the sessions well attended. Luncheons were given on both days. The following were elected as the Executive Committee for 1936, the first three named to serve as the Governing Committee: Van H. Wilshire, Specialty Papers Company, Dayton, O.; James R. Carter, Nashua Gummed and Coated Paper Company, Nashua, N. H.; Walker Hamilton, Riegel Paper Corporation, New York City; William J. Eisner, Newark Paraffine & Parchment Paper Company, Newark, N. J.; Leo E. Croy, Menasha Products Company, Menasha, Wis.; Leslie L. Jacobs, Pollock Paper & Box Company, Dallas, Tex.; Howard Larsen, Crystal Tissue Company, Middletown, O.; Preston E. Roberts, Mid-West Wax Paper Company, Fort Madison, Iowa; H. O. Nichols, Western Waxed Paper Company, Oakland, Cal., and Karl Zimmer, Zimmer Paper Products Company, Indianapolis, Ind.; Paul S. Fiske, of New York City, was again chosen secretary and manager of the Association.

**Tissue Paper Manufacturers**

Z. W. Ranck, of the Crystal Tissue Company, Middletown, O., will head the Association of Manufacturers and Converters of Tissue Paper for another year, having been re-elected president at the annual meeting of that group on February 18. Ralph Rhodes, of the Scott Paper Company, was elected vice president, and Ben F. Picola, of the Gotham Tissue Company, New York City, was elected treasurer. M. L. Lund, of New York City, was named secretary. Chairmen of the several committees and members of the Executive Committee of the Association, in addition to the above officers, are: Jumbo Roll Group—George Dunn, Dunn Sulphite Pulp & Paper Company. Roll Toilet Tissue Group—H. Wintgens, Hoberg Paper & Fibre Company. Wrapping Tissue and Specialty Group—Wayne Brown, Crown-Willamette Paper Company; Inter-fold Toilet Tissue Group—C. Alfred Wagner, Stevens & Thompson Paper Company.

**Bristol Board Manufacturers**

Concluding its well-attended annual meeting, the Bristol Board Manufacturers Group re-elected R. G. Westad, of the Waterfalls Paper Mills, New York City, as president for the ensuing year, and also re-elected Rufus I. Worrell, of the Mead Sales Company, Inc., as vice president. These two officers together with Joseph E. Holmes, Chemical Paper Mfg. Company; James B. Ramage, Franklin Paper Company; Norman Harrower, Linton Bros. & Co., and S. Dillingham, West Virginia Pulp and Paper Company, compose the Executive Committee for 1936. William R. Driver, of New York City, was again named secretary.

**Cover Paper Manufacturers**

Guy H. Beckett, of the Beckett Paper Company, Hamilton, O., was made president of the Cover Paper Manufacturers Association at the yearly session of that organization, succeeding R. S. Madden, of the American Writing Paper Company, Inc., who had served two terms as head of the Association. J. B. Shepherd, Peninsula Paper Company, Ypsilanti, Mich., was re-elected vice president. E. H. Naylor, of New York City, was elected executive secretary, and M. C. Dobrow treasurer. Previously, Mr. Naylor had been both secretary and treasurer, and Mr. Dobrow assistant secretary. The Executive Committee for 1936 consists of President Beckett, Vice President Shepherd; A. E. Frampton, Hammermill Paper Company; J. B. Van Horn, Holyoke Card & Paper Company, and Fred E. May, Rising Paper Company.

**Newsprint Manufacturers**

Officers of the Association of Newsprint Manufacturers of the United States were re-elected for the ensuing year at the annual meeting of that body. A. L. Hobson, of the St. Croix Paper Company, Woodland, Me., was again chosen chairman, and C. H. Blandin, of the Blandin Paper Company, and J. D. Zellerbach, of the Crown-Zellerbach Corporation, were re-elected vice chairmen. The Advisory Committee for 1936 is composed of J. L. Fearing, International Paper Company; Samuel Pruyn, Finch-Pruyn Company; Harold S. Smith, Maine Seaboard Paper Company, and R. H. M. Robinson, Minnesota & Ontario Paper Company.

**Paper Makers Ad Club**

Holding a luncheon meeting on the opening day of the convention, the Paper Makers Advertising Club re-elected Orin R. Summerville, of the Beckett Paper Company, Hamilton, O., president for the ensuing year; Edson S. Dunbar, Crocker-McElwain Company, as vice president, and Morris Park, Holyoke Card & Paper Company, as treasurer. Charles Cooley, of the American Writing Paper Company, Inc., was elected secretary to succeed Richard F. Linsert.

**Book Paper Manufacturers**

Charles A. Gordon, of the Oxford Paper Company, was elected chairman of the Book Paper Manufacturers Association, succeeding George H. Mead, of The Mead Corporation; W. T. Schmitt, Bryant Paper Company, was elected vice chairman; P. H. Glatfelter, of the P. H. Glatfelter Company, was again named treasurer, and Richard S. Berry was continued as secretary. Directors for two years elected are J. R. Miller, West Virginia Pulp and Paper Company; Joseph H. Fearing, International Paper Company, and A. E. Curtenius, Kalamazoo Paper Company. Directors for three years named are George K. Ferguson, Watervliet Paper Company; P. H. Glatfelter, P. H. Glatfelter Company; Clarence A. Clough, New York and Pennsylvania Company, and Roger D. Smith, S. D. Warren Company.

**Waterproof Paper Manufacturers**

At the annual meeting of the Waterproof Paper Manufacturers Association, F. E. Rothermel, of the Crepe Kraft Company, Newark, N. J., was elected president, and A. M. Anderson, of the Sisalkraft Company, New York City, vice president. These officers and Fred P. Wood, Simplex Paper Corporation, Adrian, Mich.; J. D. Young, Edgewater Paper Company, Menasha, Wis., and Frank E. Donovan, Specialties Converters, Inc., Boston, Mass., compose the Executive Committee for 1936.

**American Pulpwood Association**

Major R. R. Spessard, of N. E. Spessard & Sons, was elected president of the American Pulpwood Association at the annual meeting of that organization. Charles W. Luke, of the West Virginia Pulp and Paper Company, was named first vice president, and D. S. Field, Field Pulpwood Company, second vice president. William P. Good, of New York City, was again chosen secretary and treasurer.

**Glassine and Greaseproof**

Folke Becker, of the Rhinelander Paper Company, Rhinelander, Wis., was chosen chairman of the Glassine and Greaseproof Manufacturers Association, succeeding Robert F. Nelson, of the Glassine Paper Company. Others elected as members of the Executive Committee are Olaf Hedstrom, Hartford City Paper Company; Robert F. Nelson, Glassine Paper Company; Paul E. Hodgdon, Deerfield Glassine Company, and John L. Riegel, Riegel Paper Corporation. After Mr. Becker's election he stated that he had accepted the chairmanship with the greatest hesitancy because of the excellent work of Mr. Nelson during the last two years and only because Mr. Nelson had begged to be relieved of the duties of chairman. Thereupon Mr. Nelson was accorded a hearty vote of thanks by the members for his splendid work as chairman, and he thanked the members for their kind resolution.

# Salesmen's Annual Meeting Shows Progress for Year

THE Salesmen's Association of the Paper Industry continued to make strides forward in increasing its members during 1935, and the membership roll now totals well in excess of the 200 mark, it was brought out at the annual meeting of the Association on February 18 in the Carpenter White Room of the Waldorf-Astoria Hotel, New York. Moreover, negotiations are being carried on with a view to having a group of paper salesmen on the Pacific Coast and numbering 75 or more affiliate with the Association.

President Creighton W. Whiting, American Writing Paper Company sales representative at Chicago, presided at the annual meeting. He announced that the President's annual trophy, consisting of a golf bag, had been awarded to Edward Beimfohr, manager of the Chicago office of the Crocker-McElwain Company, for showing the greatest improvement in golf during the past year.

The financial report showed the Association to be in very healthy condition. It was announced that the A-Z Register of the Association would be completely revised and brought up to date, with George K. Gibson, first president of the Salesmen's Association, in charge of this work. It was decided that the new Register would also include a brief history of the Association and also the Association's by-laws.

In his annual address, President Creighton stated that paper salesmen did their part last year in restoring confidence within the industry and among paper consumers and converters when the Blue Eagle "was knocked off his perch" by the Supreme Court, and saw conditions improve despite the predictions of disorder by high Government officials. He also reported that the Salesmen's Association had made marked progress during the year, gaining many new members.

"The increase in membership is due to the good work of the Membership Committee, of which George K. Gibson is chairman," said President Creighton. "He has been ably assisted by the vice chairmen, R. R. Cook in the Middle West and J. K. Hutchinson, Jr., in the East. Mr. Hutchinson was responsible for the master-stroke of the year when eleven new members joined at one meeting here in New York.

"Early in the year the attention of our executives was called to the necessity of clarifying, simplifying and standardizing the trade customs and practices that now vary so widely among the different groups of paper manufacturers. As a result of our close contact with customers, we know that the present complexity and lack of uniformity already cause misunderstandings that may eventually wreck all the constructive work that has been done to bring about stability. Therefore, we again urge the A. P. & P. A. to act promptly in this vital matter.

"While we were all anxiously awaiting the next move of the N. R. A. last year, the Blue Eagle was suddenly knocked from his perch by the Supreme Court. Chaos was predicted by high administration officials. In such a crisis it was realized that the attitude and influence of salesmen would be of the utmost importance. The A. P. & P. A. turned promptly to this organized group for cooperation. This cooperation was given and instead of getting worse, conditions have gradually improved. There is still plenty of uncertainty regarding governmental acts and policies, but the Supreme Court decisions have restored confidence and it is evident that if allowed freedom of action, the paper industry can solve its own problems.

"One thing the industry should continue is the open price filing plan. This works in the interest of fair play and assures each buyer that he is buying as favorably as his competitor.

"One hardy individual has survived the N. R. A., the P. I. A., Supreme Court decisions, booms and period of depression. In fact, he thrives and grows stronger during depressions while others weaken. He is none other than our old acquaintance, the chiseling buyer. He still chisels and will continue to chisel so long as mill executives or salesmen are foolish enough to believe him, but thanks to the confidence existing between our members, his destructive tactics do not succeed as easily as in bygone days. With more mills backing us up through membership, we can still more effectively curb this pest.

"When the N. R. A. was declared unconstitutional, the P. I. A. automatically ceased operations. The government was forced to stop its efforts to control and regulate every act of business. This placed heavier responsibility on our industry. Whether the industry is going to progress from now on will depend largely on those who profess and call themselves salesmen. If we are worthy of the name, we must sell our products on a basis that will not only permit payment of fair wages and salaries, but also yield a fair return on the capital invested. For many years this fair return has been conspicuous by its absence. We should always keep in mind that neither we as individuals nor our companies can prosper unless our industry as a whole is prosperous."

Vice Presidents R. C. Johnson for the West and C. J. Slicklen for the East reported for their respective divisions of the Association, giving in brief summaries of the divisional activities during the year, including the weekly luncheon meetings and periodical golf outings.

R. C. Johnson, Chicago representative for the Northwest Paper Company, and previously Association western vice president, was elected president for the ensuing year, succeeding Mr. Whiting. E. R. Lyman, of the Missisquoi Corporation, was elected eastern vice president, and J. T. Burruss, Chicago representative for the Albemarle Paper Mfg. Company, was chosen western vice president. The election was unanimous, the selections of the Nominating Committee being accepted by acclamation.

A vote of thanks was extended the retiring president and vice presidents for the excellent work they have performed and the very satisfactory results achieved during the past year. A note of praise also was sounded for Dr. E. O. Merchant, who has served the Association as secretary and edited the Salesmen's weekly bulletin.

A new high record of attendance marked the annual Salesmen's Association luncheon which followed the annual meeting of the Association. Very close to 800 sat down to nearly 100 tables in the Grand Ball Room of the Waldorf-Astoria, enjoyed a tasty repast and listened to the speakers after the serving of luncheon. Retiring President Creighton W. Whiting acted as toastmaster.

Frank J. Sensenbrenner, 46 years engaged in the paper industry and re-elected president of the American Paper and Pulp Association; Sidney L. Willson, president of the American Writing Paper Company, Inc., and A. P. P. A. president for six years; Dr. Theo. J. Grayson, professor of finance at the Wharton School of Business, University of Pennsylvania, and "Senator" Edward Hastings Ford, professional humorist, were the speakers.

In addition to the speakers and President Whiting, seated on the dais were Charles W. Boyce, executive secretary and treasurer of the A. P. P. A.; Carl E. Whitney, association counsel; R. C. Johnson, new Salesmen's president; retiring Vice President C. J. Slicklen, and Dr. E. O. Merchant.

"None of us is sorry that the past few years have passed," said Mr. Sensenbrenner. "They were not pleasant years; they were, more than anything else, a struggle for mere existence. Too frequently such a struggle breeds hopelessness, for it tends to kill initiative and spirit. Yet in the midst of it we have as an industry created some new records. For the first time in our history we now have an organization structure that ties together through direct and affiliate membership all the industry's group agencies. Today we can deploy our forces like a well organized army on attack.

"The industry hovers, I believe, on the verge of a great forward movement. In

fact, it made notable progress in 1935. In spite of the rise in 1935, our volume of sales has not yet risen to a point that generates firmness in prices. Many companies, even some large groups in the industry, are still operating unprofitably. This is not wholesome.

"How many of us realize our responsibilities in regard to prices? Back of every sale is an organization composed of workers, managers and investors. The aggregate of these organizations in our industry mounts up to over two billion dollars in capital, nearly 150,000 workers and a large but unknown number of investors. These people and these resources are dependent upon the efficiency of our selling forces and upon the individual selling policies.

"We have learned through bitter experience what happens when prices sink below cost levels. We have but to look back to 1932 to see the devastating effects of competitive warfare. Then the combined recession of prices and volume created a chaotic condition from which none of us could find protection. We all suffered, 150,000 workers, the thousands engaged in producing our raw materials and in marketing our products, and our investors.

"In the past two and one-half years, we have stopped the devastation of our resources. But we have not yet begun the accumulation of the reserves that are necessary to modernize our equipment, to improve our products and to better our working conditions. All of this lies ahead of us. In this last drive to successful company and industry operation each of us faces heavy responsibilities. Those that rest upon the salesman are especially heavy, for his efforts largely govern the income upon which progress depends.

"The salesman, the attacking force of the industry, meets the brunt of the competitive battle. He constantly faces pressure for lower prices, pressure to give concessions. He is told hourly that his prices are too high. Every rumor finds him. He must be strong indeed to hold his ground in the face of these pressures. In his ability to do this lies not only his own economic progress but the welfare of the industry."

Dr. Grayson dealt with the economic structure of the nation, in a semi-humorous vein. The serious aspects of his remarks, in effect, noted that considerable business and industrial improvement was scored during 1935, but that the heavy industries have not yet received much stimulation and still have to move forward.

Mr. Willson, in a brief address, paid tribute to Mr. Sensenbrenner and the work of the organization in general.

President Whiting gave credit for the success of the luncheon and the record-breaking attendance to the Luncheon Committee, of which former President W. L. Raymond, of the P. H. Glatfelter Company, was chairman, assisted by Alan B. Helfrich, Harold E. Moley, Wilbur W. Langtry, E. R. Lyman and James A. Leyden.

## ◆ Exhibition for Superintendents

The Seventeenth Annual Convention of the American Pulp and Paper Mill Superintendents Association, June 24, 25 and 26, at Grand Rapids, Mich., will be marked by one of the most elaborate exhibitions of equipment, processes and supplies for pulp and paper mills that has ever been staged in this industry.

The exhibition will be staged in the Civic Auditorium, adjacent to the Pantlind Hotel, where the superintendents will hold their business sessions.

The Civic Auditorium is especially designed for industrial exhibitions, with forty-four thousand square feet of space, gas, water, and d-c. and a-c. current at every column. There are ample facilities for trucks bringing heavy equipment right into the basement of the building. The entire space is air conditioned, which will keep it comfortable under hot weather conditions, and F. L. Zellers, General Chairman of the Superintendents Convention, announces that there will be a special program of entertainment features in the center of the exhibits as an added attraction to pulp and paper making executives.

Many of the exhibitors are planning to present commercial equipment or working models in actual operation, while others in the supply field will present demonstrations of the commercial application of their products in pulp and paper mills.

The auditorium is ideally suited for such an exhibition and every booth is equipped with power, light, gas and water supply. The auditorium is so arranged that trucks carrying heavy equipment can bring it right into the basement of the auditorium, whence elevators bring it right to the exhibition floor.

There has been an exceptional demand for large display spaces, in excess of the size of the regulation booth, and arrangements are being taken to meet this demand for extra space.

Meantime, the chairman of the various subcommittees are lining up a program for the Superintendents Convention that they are ambitious to make of greater value to visiting pulp and paper mill executives than any of the preceding conventions.

John H. Brougham, Chairman of the Paperboard Group, announced that the meeting for paper board makers will be featured by an interesting demonstration in which a rubber roll will be vulcanized. This board group meeting will also include a talk by a representative of the Manhattan Rubber Manufacturing Division of Raybestos, Inc., and Mr. R. D. Kehoe, President of the Paper and Industrial Appliances, Inc., will present a paper on "Hydraulic Beating," setting forth the method of operation and the results produced.

National President Charles Champion has stressed the fact that this will be a "Business Before Pleasure Convention." According to Mr. Champion that while ample provision for entertainment will be included in the program, all those attending the Convention will be requested to attend the business sessions and to give full time to the business aspects of the convention and the exhibition in accordance with the schedule set forth in the official program. Mr. Champion solicits complete cooperation of all members of both the paper and allied industries in adherence to this "Business Before Pleasure Policy."

The Convention Committee held a meeting on January 26, when it was found that plans for the annual meeting are progressing rapidly.

Mrs. Paul Fortier, Chairman of the Ladies Entertainment Committee, outlined a splendid program for the women visitors, including many attractive forms of entertainment and interesting motor trips.

F. D. Bowman, who has become a national figure through his presentation of Carborundum programs over the Columbia Broadcasting System, is lining up a program of radio headliners to provide entertainment at the convention.

One of the finest golf courses in south central Michigan will be available to the visitors.

A. L. Sherwood, Chairman of the Sub-Committee on Program and Papers, reports that his preliminary program indicates this convention will give the visiting superintendents a thorough review of all that is new and worth while in pulp and paper making developments.

Chairman Zellers reports that reservations are already being filed at the Hotel Pantlind in exceptional numbers.

He urges all those planning to attend the convention to lose no time in sending their reservations to the Pantlind Hotel, Grand Rapids, Mich.

More than a score of supply and equipment companies have already applied for exhibition space. Reservations for space at the exhibit should be filed with Mr. S. R. Atkinson, Executive Secretary, P. O. Box 237, Niles, Mich.

National President Charles Champion and National Secretary R. L. Eminger are working in close co-operation with the committee headed by Mr. Zellers.

Other members of the committee are: Mrs. Paul Fortier, Ladies' Entertainment; E. H. Gilman and Michael Redmond, Reception; F. D. Bowman, Entertainment; F. D. French, Finance; O. F. Fischer, Transportation; J. A. Wise, Mill Visits; A. L. Sherwood, Program and Papers; D. Stacy, Registration and Exhibits; C. F. Sisson, Sports; J. L. Hodgins, Publicity, and S. R. Atkinson, Executive Secretary.

## ◆ Great Lakes Mill May Be Acquired by Publishers

A recent press report states that twenty-four newspaper publishers are negotiating for the purchase of the Great Lakes Paper Company, Ltd., Ft. William, Ont.

The purpose of the plan is to assure an uninterrupted newsprint supply, and to establish an absolutely independent mill. According to the report, John E. Getfaell has been authorized to obtain additional contracts for ten-year periods, with out-

side publishers, if necessary, so that the Great Lakes mill may operate at least 90 per cent of capacity, which in turn, would make possible maintenance of dividend payments to stockholders.

Until the completion recently of the new Kemsley Paper Mills in England, the Great Lakes 304-inch fourdrinier machine was the largest newsprint machine in the world. The machine in the English mill makes a sheet 320 inches wide.

### ◆ James Garfield Ramsey

James Garfield Ramsey, superintendent of the Everett Pulp and Paper Co., Everett, Wash., passed away February 13, at his home in Lowell, Wash.

Mr. Ramsey was 56 years of age. He had spent practically all of his life in the field of papermaking. He had held positions with several large paper manufacturing companies and had been connected with the Everett Company for the past three years. Mr. Ramsey was a prominent figure in the affairs of the American Pulp and Paper Mill Superintendents Association, having been its president during the year 1930. He was also active in the Technical Association of the Pulp and Paper Industry, especially the Pacific Coast branch of T. A. P. P. I. which was organized several years ago.

Surviving are the widow and three sons, all residing at Lowell, Wash.

### ◆ Announce Group Chairmen for Supers Annual Meeting

In a joint statement recently issued, President Charles Champion and General Chairman F. L. Zellers announced the appointment of the following group chairmen to preside at the group meetings which will be a feature of the Convention of the American Pulp and Paper Mill Superintendents Association, June 24, 25 and 26 at the Hotel Pantlind, Grand Rapids, Mich.:

Sulphite Pulp—S. E. Tomczak, Flambeau Paper Company, Park Falls, Wis.

Ground Wood Pulp—Sidney D. Wells, Combined Locks, Wis.

Sulphate Soda Pulp—C. S. Stoke, Tomahawk Kraft Paper Company, Tomahawk, Wis.

Board—John H. Brougham, Penn Fibreboard Corporation, York, Pa.

Book and Fine Papers—J. R. Simpson, Champion Fibre and Paper Company, Hamilton, Ohio.

Tissue—H. H. Harrison, Crystal Tissue Co., Middletown, Ohio.

### ◆ The Story of News Print in Advertising

The Newsprint Service Bureau, New York City, has launched a campaign of advertising on behalf of the North American newsprint industry.

The first of this series of advertisements—a two-page spread—appeared in the February 29 issue of *Editor & Publisher*. The purpose of the advertisements is to tell some of the basic facts about the newsprint industry in simple non-controversial fashion.

### ◆ Report That Container Corp. Considers New Plant

According to an official announcement, a very important project is under consideration by the Container Corporation of America. This announcement, which was given out following the meeting of the Board of Directors on February 26, stated that because this project which holds interesting profit possibilities and further insures the company's and stockholders' future, but which also requires a financial investment, the Board had concluded to take no action on dividends at this particular time. Audited earnings for 1935 were $1,238,009.27 or $1.89 per share on the present outstanding capital, as compared with 1934 earnings of $1,112,711.

A press report, superseding the official announcement, states that the "very important project" refers to plans which the Container Corporation is considering for the construction of a new mill for the manufacture of kraft pulp and paper. It is reported that further information on the proposed project will be given out in the near future.

### ◆ Frank J. Harwood Honored

On the evening of February 15, F. J. Harwood, president and general manager of the Appleton Woolen Mills, Appleton, Wis., was honored guest at a dinner given by the employees of the company.

It was the purpose of this occasion to pay tribute to Mr. Harwood's long and faithful service during a 55-year term as general manager of the company. He has resided in Appleton for the past 60 years, and has become one of the community's outstanding figures in civic, religious and welfare activities.

At the complimentary dinner, Mr. Harwood was presented with a bronze plaque by the officers and employees of the company as a token of affection, high honor and esteem.

◆ A NEWS RELEASE states that the Rust Engineering Company has been given the contract to build the new $4,000,000 kraft mill for the Crossett Lumber Company at Crossett, Ark. It is stated that the plant will occupy a twenty-acre site and have a capacity of 150 tons of paper and pulp daily. It is expected construction will be completed late this year.

### ◆ Wilbur White Co. Acquired by Franklin Research Co.

The Franklin Research Co., Philadelphia, has purchased from the Innis Spieden Co., New York, the going business of its subsidiary, the Wilbur White Chemical Co. of Oswego, N. Y.

The company will be operated as a division of the Franklin Research Company, and W. A. Bridgeman, formerly president of the Wilbur White Chemical Co., has been retained as managing head of an industrial department which will pursue the further development and sale of special water emulsion formulas for specific industrial uses.

### ◆ Carl Magnus Now With Waterfalls Paper Co.

Carl Magnus, who has been associated with the Standard Paper Manufacturing Co., Richmond, Va., for the past 15 years, is now connected with the Waterfalls Paper Co., Mechanic Falls, Maine, in the capacity of production manager.

Mr. Magnus is well known in the industry, having served as president of the American Pulp and Paper Mill Superintendents Association for the year 1931-1932.

### ◆ A. J. Kennedy

Archie J. Kennedy, president of the Sandy Hill Iron and Brass Works, Hudson Falls, N. Y., passed away February 15 after a short illness.

Mr. Kennedy had been associated with the Iron and Brass Works since October, 1907, and had served continuously as president since August, 1919.

The widow and a daughter survive.

### ◆ Gair Company Acquires Box Plant

Acquisition of the Peerless Paper Box Manufacturing Company and plant at Cleveland, Ohio, by Robert Gair Company, Inc., was announced recently.

The business of the company will be carried on under the name of Gair Cleveland Cartons, Inc., with E. Victor Donaldson, president; L. H. Gaetz, executive vice-president; Fred Hashagen, vice-president and manager; W. F. Howell, secretary; Ernest Meyer, treasurer; and E. O. Sommer, comptroller.

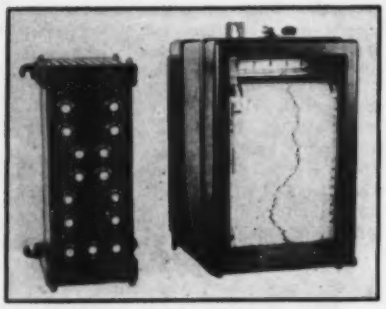
◆ THE LINK BELT COMPANY'S Stoker Department has established a permanent stoker exhibit on the ground floor of the Bell Building, in which the company's offices are located, fronting on Michigan Avenue, Chicago. The display room is attractively furnished in the modern mode and exhibits residential, commercial and industrial types of stokers. Visitors to Chicago will find the display very interesting.

◆ C. M. OBERLING, formerly purchasing agent of The Container Corporation of America, Chicago, has become associated with the W. S. Nott Company, Minneapolis, Minn., well-known manufacturers of leather belting and leather specialties. This association is in the capacity of branch manager in charge of the Chicago office of the company, which is located at 108 North Clinton Street. The territory to be served by Mr. Oberling covers much of the central portion of the United States.

◆ THE JOHNSTON & JENNINGS CO., Cleveland, Ohio, announces the appointment of Faville-LeVelly Corp., 140 S. Dearborn St., Chicago, as sales and engineering representatives of the company's stokers in the Chicago territory. W. J. Williams, for many years with The Edgemore Boiler Co., is now connected with the Faville-LeVelly Corporation.

### ◆ Graphic K. V. A. Meter

The Esterline-Angus Company, Indianapolis, Ind., has announced a new graphic k. v. a. meter in which the direct measurement of k. v. a. is accomplished by interposing a phase shifting network between the line and the instrument. In order to adapt the instrument to circuits of different power factor, the network is provided with three taps, one for use where the power factor ranges from .54 to .82, a second



for power factors between .68 and .90, and a third for values from .75 to .94. The network is so designed that the instrument can be used on either three-phase three-wire or three-phase four-wire circuits. It can be used interchangeably on either 110 or 220-volt circuits. For use on higher voltages two potential transformers are required.

Four kinds of cases are furnished for the instrument; namely, flush switchboard, front switchboard, wall mounting, and portable. The cases are of die-cast aluminum, finished in black, baked enamel with nickel trimmings. Any one of five standard chart drives may be used.

The measuring element is of the electro-dynamometer type having four stationary coils, which produce the fields, and having two moving coils mounted on a common staff. The terminals of the instrument are carried in Bakelite supports, and are attached before the measuring element is placed in the case.

The flow of ink is by capillary action from well to pen, the ink not being exposed to air during its passage. The pen is carried and operated directly by the moving system of the meter.

### ◆ High Melting Synthetic Wax

The Glyco Products Company, Inc., 949 Broadway, New York, N. Y., has introduced Albacer as a high melting, synthetic wax that is free from paraffin wax, chlorine, phenol or any harmful, corrosive or toxic substances. This wax, which is hard, white, and highly lustrous, has a melting point of 95-57 deg. C. It is free from odor and taste, is insoluble in water, but is soluble in hydrocarbon and chlorinated solvents. It can be melted with synthetic resins with mineral and vegetable oils, and with other waxes. The wax is recommended, among other applications, for paper and similar coatings by its introducer.

### ◆ Product for Improving Concrete

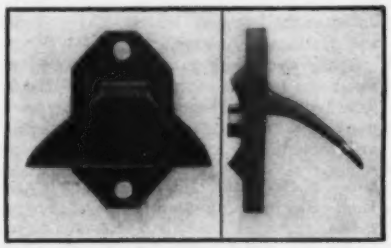
The Flexrock Company, 800 North Delaware Avenue, Philadelphia, Pa., has announced a product made from a combination of three chemicals under the name of Concretdense for use in connection with concrete work. This product when used as one of the ingredients of the mortar is claimed to produce waterproof concrete, and to provide a more dense and more wear-resistant concrete. Such mortar also is said to bond better to old concrete and it is further stated that the resulting concrete may be used fifteen hours after installation.

The manufacturer suggests the use of Concretdense for new concrete construction, for resurfacing, and for patching. The tendency of the product to create an internal heat during the setting period makes it possible, according to added claims, to do concrete work in freezing weather if any reasonable precautions are taken.

More detailed information regarding this product and its use may be obtained direct from the manufacturer.

### ◆ Nozzle for Water Spray

A nozzle with a fish-tail spray for use with water in a single unit or in multiple and designated as the Concenco has been placed upon the market by The Deister Concentrator Company, Fort Wayne, Ind. This nozzle is designed for application to 1 in., 1¼ in. and 1½ in. spray lines and is furnished with any one of three discharge orifices, namely: 3/16 in., ¼ in. and 5/16 in. The head of the nozzle is supplied either



in brass or in cadmium plating, while brass is used for the connecting means.

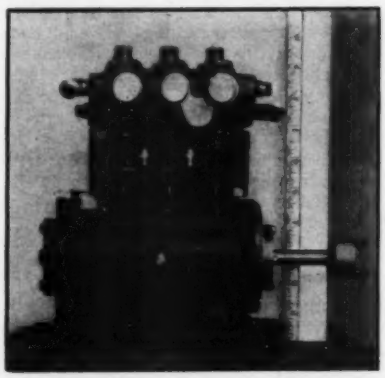
To make an assembly, it is only necessary to drill an oversize hole and to clamp the nozzle in place with U bolt and nuts—a gasket being placed between the nozzle and spray pipe. Where a row of nozzles is to be assembled on one line, a ⅛ in. clearance on holes is allowed so that all nozzles can be easily aligned during assembly.

### ◆ Trolley Wheel for Overhead Conveyor

A trolley wheel of improved design for use in connection with tramrail systems of their manufacture has been announced by The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland, Ohio. This wheel is a high strength iron casting with deep-chilled tread and flange. Slight crown of the wheel tread is said to bring the wear on the rail flange in from the outside while the straight flange of the wheel is stated to be a factor in reducing rolling friction to a minimum. A double row shielded type ball bearing, dust protected and grease lubricated, is an added feature of the design.

### ◆ Small Capacity Positive Displacement Pump

The Homestead Valve Manufacturing Company, Coraopolis, Pa., has developed a triplex plunger pump to handle fluids at relatively high pressures and in small quantities. It is a single acting plunger type pump having three cylinders of ¾ in. bore and ⅝ in. stroke with the plung-



ers attached to cross-head guides which are driven by connecting rods from the crank shaft. The inlet valves are of the poppet type, while the outlet check valves are of the ball type. Gears, crank shaft, connecting rods and cross-heads are enclosed in a crank case with splash lubrication. The crank case is made of semi-steel; the cylinder head of a corrosion resisting iron alloy.

The capacity of the pump, depending upon its speed, may be varied from about 15 to 120 gallons per hour. Its pressure range varies from 0 to 500 pounds, and power requirements from 1/6 to 1/2 hp.

### ◆ Bronze, Brass and Copper Welding Electrode

An arc welding electrode, known as "Aerisweld," has been announced by The Lincoln Electric Company, Cleveland, Ohio, for the welding of bronze, brass and copper. The electrode is suggested, among other applications, for the welding of busbars, impeller blades in pumps and turbines, and for the reclamation of worn parts of equipment. The electrode is made in two sizes—5/32 in. and 3/16 in., and in 14-in. lengths.

### ◆ Seamless Alloy Tubes

The commercial production of seamless tubes and pipe of B & W Croloy 25-20, a highly alloyed steel containing 25 per cent chromium and 20 per cent nickel, has been announced by the Babcock & Wilcox Tube Company, Beaver Falls, Pa. These tubes and pipe are

available hot finished in sizes up to 6 inches outside diameter and cold-drawn in smaller sizes.

The alloy from which such tubes and pipe are made has a high degree of oxidation resistance and is suitable for continuous operation at temperatures up to approximately 2100 deg. Fahr. Likewise, it is a ductile material which possesses, it is claimed, greater creep strength and resistance to oxidation at high temperatures than other alloys now commercially available in the form of seamless tubing.

### ◆ Non-Sparking Laboratory Stirrer

A laboratory stirrer, the Lab-Mix Sr., has been announced by the Chemical Publishing Company of New York, Inc. This stirrer with shaft and propeller of Monel, and said to have been evolved to meet the demand for a more powerful, variable speed, low priced, non-sparking unit, is actuated by a shaded pole type motor. A rheostat, which permits the speed to be varied, serves also as an on and off switch. The motor through a flexible 6-foot cord and plug that may be plugged in any outlet operates only on 110 volts (50-60 cycle) a. c. The unit is provided with a screw clamp which fits any ring stand.

### ◆ Electric and Air-Operated Lubricant Guns

Alemite, a division of Stewart-Warner Corporation, 1878 Diversey Parkway, Chicago, has augmented its "Rock Crusher" line of heavy duty power guns for industrial lubrication with electric and air-operated twin guns. The air-operated RA-40 gun delivers eleven to eighteen ounces of lubricant per minute at 150 to 200 pounds air pressure, the pressure developed being approximately thirty-three times the air pressure used. The

electric-operated RL-40 is powered with a Universal motor for a-c. or d-c. current. This gun develops approximately 5000 pounds of pressure and delivers nine ounces of lubricant per minute. Both of these guns are portable, and can handle all types of the heaviest and most fibrous lubricants.

### ◆ Water Filter Reduces Rejects

Rejections of finished board have been reduced by a New Jersey mill through the installation of a specially designed Purolator filter for handling a portion of its raw water requirements. This filter, the product of Motor Improvements, Inc., Newark, N. J., well-known manufacturers of filters for automotive motors and for various industrial purposes, is of the usual Purolator metal-edge type. The filtering element is made of stainless steel and is 6 inches in diameter by 19½ inches in length. It has a surface area of 374.166 square inches and a slot area of 60.45 inches with slot openings of .005 of an inch. Cleaning knives, against which the element may be manually rotated, are attached to the unit.

### ◆ Color Analyzer

A new instrument, known as the recording photoelectric spectrophotometer, has been exhibited by the General Electric Company, Schenectady, N. Y., as a color analyzer for a wide variety of materials. The material to be examined is placed in the instrument, operation is started, and in less than three minutes the operator may remove a chart which shows how much of each wave length of light is reflected or transmitted by the sample.

The instrument consists essentially of a monochromator, photoelectric photometer, and means of recording their respective indications.

### ◆ Underground Pipe Line Insulation

A new insulation for underground steam and hot water pipe lines is being offered by the American District Steam Company, North Tonawanda, N. Y. This insulation, known as Adsco Cell-Concrete, is made from Portland cement mixed with a foam. It can be mixed on the job and poured around one or more pipes in conduits of various constructions. The resulting product is a rigid cellular concrete of a specific gravity of approximately 0.3 that is stated to possess low heat conductivity, the ability to retain its physical strength and shape, and the ability to regain its insulating value after repeated submergence in water.

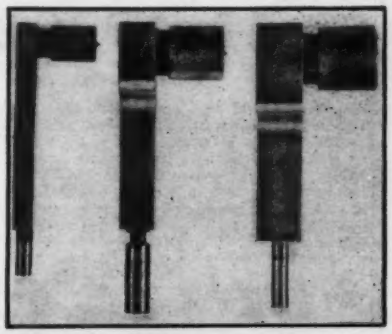
### ◆ 250-Watt Mercury-Vapor Lamp

The General Electric Vapor Lamp Company, Hoboken, N. J., and the Incandescent Lamp Department, Nela Park, Cleveland, Ohio, have announced the development of a new high intensity 250-watt mercury-vapor lamp. This lamp, of much smaller dimensions than its 400-watt companion lamp, is equipped with tubular bulb and a standard screw base socket, has an efficiency of 25-30 lumens per watt, and produces as much light as is delivered by 425 watts in incandescent lamps.

The lamp is recommended for applications which do not permit the use of the standard 400-watt high intensity mercury-vapor lamp.

### ◆ Angle Tool Attachments

C. A. Koza, 464 Augustine Street, Rochester, N. Y., has announced a line of angle tool attachments for use in drilling, boring, grinding, filing, sawing, slotting, reaming, countersinking, burring, counterboring, tapping, milling and keywaying. These attachments have been designed to permit easy access to other-



wise inaccessible places with ordinary tools in the making of machine repairs. The attachments can be driven by air or electric drill, drill press, lathe or milling machine—direct, or through a flexible shaft. It is claimed that these attachments often save their entire cost on their first job by making it possible to get at some broken bolt or part without resorting to extensive tearing down work.

More detailed information regarding these attachments and their application will be supplied by the manufacturer upon request.

### ◆ Thermal Air Eliminator

The V. D. Anderson Company, 1935 W. 96th St., Cleveland, Ohio, has announced the development of a new thermal air eliminator for exclusive use on the Anderson Super Silvertop inverted bucket steam trap. This device utilizes a Spencer thermostatic disc, which, in the cold position, curves out and away from three auxiliary ports on the side of the inverted bucket, thus permitting air to pass through the trap. The eliminator remains open until the critical temperature which accompanies live steam is reached. Then it snaps to the closed position, tightly covering the ports and permitting normal operation of the trap.

The manufacturer claims that with this design of eliminator there will be no delay in air elimination due to premature closing and no steam loss due to slow closing.

### ◆ Air Compressor of New Design

A two-stage sliding vane rotary air compressor made in sizes for actual air deliveries from 69 cfm to 412 cfm at 100 lb. G. pressure has been announced by the Allis-Chalmers Manufacturing Company, Milwaukee, Wis. Both stages as well as the intercooler in this compressor are in a single casing. Among the

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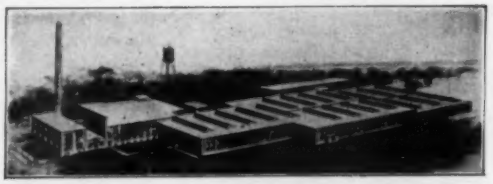

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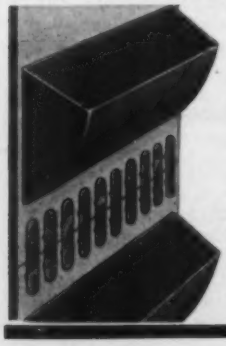

Note how recessed plates compress belt end. Internal friction and ply separation in belt ends is overcome. The tight butt of the belt ends prevents passage of materials or liquids through the belt. Made in steel, "Monel Metal," non-magnetic and abrasion resisting alloys. Five sizes. Sold by jobbers and belting houses. Consultation regarding belt joining invited.

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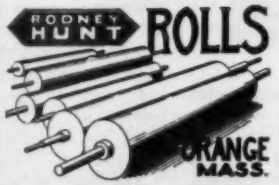


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advantages cited for this compressor, designated as "Ro-Twin," when compared with the usual design of two stage rotary having two separate cylinders, are: greatly reduced length and floor space, less weight, one stuffing box and coupling, no external air piping between stages to keep tight, and a simpler lubrication system. The air delivery of such a compressor is also free from pulsations.

## ◆ Container Corp. to Exhibit Miniature Board Mill

A complete paperboard mill in miniature, showing in detail the manufacture of paperboard stock used in making the thousands of familiar packages known to the public, is one of the outstanding features planned for the Sixth Annual Packaging Exposition which will be held in the Hotel Pennsylvania March 3rd to 6th.

The mill will be centered in the exhibit space of the Container Corporation of America, well-known manufacturer of cartons and shipping containers. Operated by hand the mill dramatically presents the five steps which transform salvage paperstock and new paper pulp into tough paperboard for shipping containers and cartons.

◆ EMIL J. HANSEN has been appointed general sales manager of the Wisconsin Tissue Mills, Menasha, Wis., according to a recent announcement sent out by the company.

◆ ANNOUNCEMENT is made by Link-Belt Company, Chicago, that the Feenaughty Machinery Company has been appointed distributor for Link-Belt Shovels, Cranes, Draglines in Pacific Northwest territory. Feenaughty headquarters are in Portland, Oregon, with branches located in Seattle and Spokane, Washington, and Boise, Idaho. The organization is headed by W. O. Feenaughty, president; J. I. Overman, vice-president; D. J. Feenaughty, secretary; and F. A. Kingston, sales manager.

◆ ◆

## ◆ New Catalogues and Publications

**Alemite,** 1862 Diversey Pkwy., Chicago —"The Case of Alemite vs. Friction" is a new 32-page catalogue of equipment produced by this company (a division of Stewart-Warner Corp.) for industrial lubrication. Contains complete information and prices of equipment in all the Alemite systems. Fully illustrated with diagrams, photographs and drawings. Copies on request.

**Allis-Chalmers Mfg. Co.,** Milwaukee, Wis.—Bulletin No. 1261 is devoted to the Allis-Chalmers New Vari-Pitch Texrope Sheave. This bulletin illustrates not only the stationary controlled type but also the motion controlled type together with the company's new straitline automatic ball bearing motor base. There are general dimension tables for both types. Copies on request.

**American Paper Mach'y and Engr. Works, Inc.,** Glens Falls, N. Y.—A new bulletin under the title "Progress" has just been issued by this company. The bulletin features new Apmew pulp and paper mill machinery, with description, application and illustrations. The bulletin covers such equipment as Apmew screens, hydrafiner, continuous filter, save-all, thickener, stuff pumps, agitator, recording automatic consistency regulator, freeness regulator, stuff meter, float valves for paper stuff, wet machine, continuous beater system, rotary sulphur burner, etc.

**American Rolling Mill Co.,** Middletown, Ohio—A folder contains Useful Facts about Armco H.T.-50, the special high tensile steel. The folder describes grades and finishes, shows the average physical properties, and outlines the characteristics of this material.

**The Austin Company,** Cleveland, Ohio—Companies that are looking forward to rebuilding or expanding will be interested in a new edition of a booklet "Your New Plant — Multistory or Single Story — Which?" just published by this company. This booklet follows the modern trend in industrial construction, and is well illustrated. Floor diagrams, comparative costs, etc., are included. Copies of the publication and any information desired will be furnished by the company.

**Bausch & Lomb Optical Co.,** Rochester, N. Y.—This company's Spectrum Measuring Microscope, devised for rapid and precise measurement of the linear intervals between spectrum lines on the photographic plate, is the subject of a new folder, just issued. The instrument is illustrated, its characteristics, construction, scale, etc., outlined. Specifications and prices also are included.

**Chain Belt Company,** Milwaukee, Wis.—This company's latest bulletin, No. 266, is devoted to Rex-Stearns Timken Idlers. The presentation is largely pictorially on "How to Handle It" with these idlers in various industries. The performance, construction and application is graphically told. The first page of the bulletin is a reproduction of painting that was reproduced on the August 1934 issue of *Fortune*. This picture shows the Hudson River Stone Company—standardized throughout on Rex-Stearns Timken Idlers.

**Combustion Engineering Co., Inc.,** 200 Madison Ave., New York City—An attractively illustrated catalogue on the CE-Heine box header boiler is being distributed by this company. Illustrated in the booklet is the first Heine boiler built in 1882 and now in the Ford Industrial Museum at Dearborn, Mich. Besides descriptive matter and numerous photographs of boiler details and typical finished installations, there are included drawings of ten different setting arrangements as adapted to various fuels and methods of firing. Views of shop equipment for annealing and X-raying the drums are also shown.

**Davis Regulator Co.,** 2541 Washtenaw Ave., Chicago—The various types of valves made by this company are described in a new Bulletin No. 101, under the title "Davis Valve Specialties." There are outline drawings, diagrams and numerous tables of data, dimensions, etc.

**Fafnir Bearing Co.,** New Britain, Conn. —A comprehensive review of the principles affecting the selection, application and operation of anti-friction bearings, and ball bearings in particular, has been prepared by this company in the form of a wire-bound engineering manual totalling almost 200 pages. The book is in five sections. Section 1 reviews the history and development of anti-friction bearings, with particular emphasis on the improvement in characteristics. In Section 2, 30 pages are devoted to a broad analysis of bearing selection, on the basis of type, size and desired life expectation. Section 3, totalling 118 pages, reviews in detail the dimensions, load ratings and functional characteristics of a complete list of bearing types and sizes, including industrial pillow blocks and roller bearings, as well as ball bearings. Section 4 brings a thorough review of shaft-fitting methods, housing and mounting instructions and advice on lubrication. Also in this section is much information on lubrication. Section 5 of the manual includes a separately bound list of prices and weights as of January, 1936. The make-up of this manual is distinctive. It is bound with a new type of continuous wire binding which holds the backbone of the cover flat. The book has round corners and is bound with a stiff paper cover simulating leather. A new type of continuous wire binding is used which holds the backbone of the cover flat. The new manual is available gratis to executives and engineers responsible for bearing selection or maintenance if requests are addressed on company letterheads.

**Foote Bros. Gear and Machine Co.,** 5301 S. Western Blvd., Chicago—A new Handbook on Worm Gearing and HYGRADE Worm Gear Speed Reducers has just been published by this company. The handbook contains 86 pages and is the convenient pocket size with round corners. The first 19 pages of the book cover the evolution of worm gearing and the customer's problem which deals with the efficiency, selection, helix angle, etc. This book is filled with valuable information and data for executives and engineers.

**Haynes Stellite Company,** 205 E. 42nd St., New York City—A new booklet is devoted to the subject of this company's stellited valves. The manufacturer's claim for increased life and economy from the application of Haynes Stellite is fully outlined. The booklet is profusely illustrated and printed in two colors.

**Lewis-Shepard Co.,** Watertown, Mass.—A new circular, No. 317, is claimed by this company to be the first of its kind devoted exclusively to factory and warehouse floor trucks and lift trucks equipped with noiseless, easy rolling, rubber-tired wheels. Copies may be had on request.

**Metals Coating Company of America,** 495 N. Third Street, Philadelphia—The MetaLayer molten metal spraying system and equipment is featured in two new folders just issued, Nos. 1203 and 1204. The text explaining how the system works, is amplified by many photographs of the equipment and actual applications. The use of the system with paper-mill dryer rolls is illustrated.

**Oilgear Co.,** 1319 W. Bruce St., Milwaukee, Wis.—Bulletin 6000 takes up the salient features of the New Oilgear Fluid Power Transmissions, which have been greatly simplified and improved by a redesign of input and output units. The simplified mechanism of the new models is shown by comparison with the old, and the construction and operation are fully outlined. The bulletin is well illustrated with halftones, graphs and charts and contains full information on the subject. Copies gratis.

**Pyrometer Instrument Co.,** 104-109 Lafayette St., New York City—The new Pyro —the simplified optical pyrometer is featured in catalogue No. 70. The principles of the instrument are clearly explained, with instructions for its maintenance. There are a number of illustrations and diagrammatic drawings. Copies on request.

**Sherwin-Williams Co.,** Dept. IMW-10, Cleveland, O.—Prepared with the co-operation of the Better Vision Institute and Better Light-Better Sight Council, the new Sherwin-Williams Save-Lite catalogue is a factual presentation of painting as a part of lighting and plant conditioning. In a concise manner, this catalogue shows what a wall and ceiling paint should be, and its importance as an aid to better and more economical production as well as for beauty and protection. There are other features such as laboratory studies and industrial applications, case histories, simple charts on lighting standards and plant interior paint uses. Copies on request.

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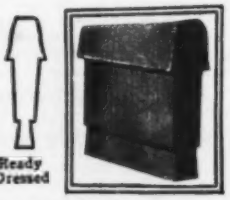


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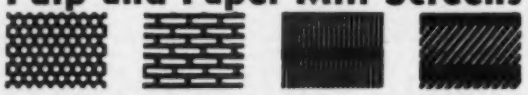

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## ◆ T.A.P.P.I. Summer Meeting in Canada

Although it has been customary for the Technical Association of the Pulp and Paper Industry to hold a fall meeting each year, this practice will be changed somewhat in 1936. Arrangements have been approved by the Executive Committee to hold a joint meeting with the Technical Section of the Canadian Pulp and Paper Association from August 3 to 7, 1936.

The meeting will include a full day business session in Montreal and a trip by boat up the Saguenay with one day stopover in Quebec.

Visits to the mills in the district are being arranged and will include Anglo-Canadian Pulp and Paper Mills at Quebec; Donnacona Paper Mills at Donnacona; Price Brothers at Riverbend; the plant of the Aluminum Company at Arvida; the power development at Isle Maligne and other points of interest.

The boat, S. S. Quebec, will be chartered for the occasion. Rates on the boat are $45 for each person (2 in a room), outside rooms; $47 for each person (2 in a room), outside room with private toilet. This fare will include registration fee which will cover luncheon in Montreal and specified mill visits and sightseeing expenses. Ladies are invited and special committees will provide entertainment.

A tentative program subject to alterations is as follows:

*Monday, August 3rd:*

Registration—Windsor Hotel, Montreal.
10:00 a.m. Business Session—Papers and Discussion.
1:00 p.m. Luncheon.
2:30 p.m. Business Session—Papers and Discussion. (Sightseeing and shopping tours will be arranged for the ladies)
7:00 p.m. Leave on S. S. Quebec for Quebec.

*Tuesday, August 4th:*

Arrive Quebec, 7:00 a.m.
Day in Quebec—Visit to Anglo-Canadian mill.
Visit to Donnacona mill (special fare).
Sightseeing trips as given below.
7:00 p.m. Leave Quebec for Murray Bay.

*Wednesday, August 5th:*

Arrive Murray Bay, 7:00 a.m.
Visit Manoir Richalieu. Golf and Swimming.
Leave Murray Bay at 1:00 p.m.
Arrive Bagotville 8:30 p.m.

*Thursday, August 6th:*

Morning by train to Riverbend (Price Bros. mill).
Afternoon return to Arvide (Aluminum Company plant).
Return to Bagotville, 6:00 p.m.
Leave Bagotville, 6:30 p.m.

*Friday, August 7th:*

On the Boat: Morning—Business Sessions
Papers and Discussion.
Afternoon—Business Session
Papers and Discussions.
4:30 p.m. Arrive Montreal.

At Quebec numerous side trips will be available:

1—City sightseeing trip (1½ hours), $1.
2—To Donnacona Mill (4 hours), $2.50.
3—St. Anne de Beaupre, world famous shrine (4 hours), $2.50.
4—Isle of Orleans (4 hours), $2.50.
5—Kent Golf Links (return trip), $1.25.
6—Royal Quebec Golf Club (return trip), $1.50.

Tickets for these trips will be on sale on the boat.

The accommodation on the boat is limited to 500 persons, and a number of reservations have already been received.

Reservations are to be made direct with L. S. Tobin, Economical Tours, 1409 Peel Street, Montreal, P. Q.

Applications for reservations must be accompanied by a deposit of $25.

Anyone interested may attend this International meeting and should make reservations early.

A very limited number of rooms with twin beds and private bathroom is available at a cost of $56 per person and will be allotted on the basis of "first come, first served."

Additional information may be obtained from R. G. Macdonald, Secretary of T.A.P.P.I., 122 East 42nd Street, New York.


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*for*
PULP • CHEMICALS
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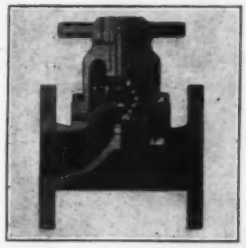

The design of this valve is a departure from ordinary design. It is free operating with all working parts isolated from substances handled, eliminating any possibility of jamming or sticking.

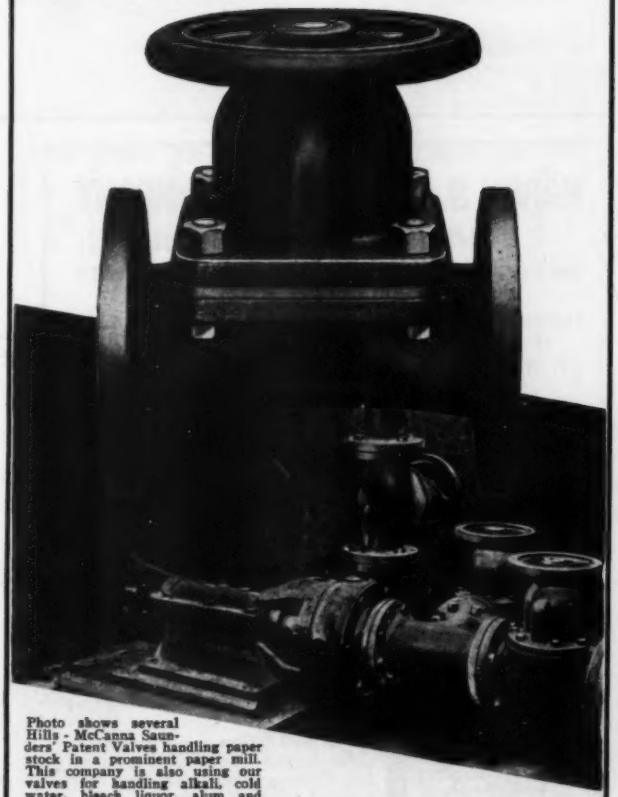

Photo shows several Hills - McCanna Saunders' Patent Valves handling paper stock in a prominent paper mill. This company is also using our valves for handling alkali, cold water, bleach liquor, alum and calcium carbonate slurry.

Literature and Prices Upon Request

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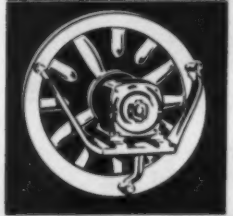
## Fans



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| | PARTICIPANT | MILL | LOCATION |
|---|---|---|---|
| GROUP A | Hollingsworth & Whitney Co. | Algonquin & Taconnet | Waterville, Me. |
| GROUP B | | | |
| GROUP C | Continental Paper & Bag Corp. | York Haven | Pennsylvania |
| | International Paper Co. | Little Island | No. Tonawanda, N. Y. |
| | Finch, Pruyn & Co., Inc. | Glens Falls | New York |
| | Ontonagon Paper Corp. | Ontonagon | Michigan |
| GROUP D | Harriman Company | Harriman | Tennessee |
| | International Paper Co. | Webster | Orono, Maine |
| | Hollingsworth & Whitney Co. | Arcostook & Cobbossee | Gardiner, Me. |
| | Bird & Son, Inc. | Phillipsdale | Rhode Island |
| | U. S. Gypsum Co. | No. Kansas City | Missouri |
| | Spaulding Fibre Co., Inc. | Milton | New Hampshire |
| | Central Fibre Prods. Co. | Vincennes | Indiana |
| | U. S. Gypsum Co. | Gypsum | Ohio |
| | Hollingsworth & Whitney Co. | Abenaquis | Madison, Me. |
| | Central Fibre Prods. Co. | Mt. Carmel | Illinois |
| | Mead Paperboard Co. | Rockport | Indiana |

**Division II—Remanufacturing**

| | | |
|---|---|---|
| Union Bag & Paper Corp. | Specialty | Hudson Falls, N. Y. |
| Kimberly-Clark Corp. | Atlas | Appleton, Wis. |
| Texas Corrugated Box Co. | Dallas | Texas |
| U. S. Gypsum Co. | Genoa | Ohio |
| Bemis Bros. Bag Co. | East Pepperell | Massachusetts |

**IMPERFECT SCORES**

| | Key Number | Rank | Disabling Injuries | Frequency Rate |
|---|---|---|---|---|
| GROUP A | P- 55 | 2 | 3 | 3.415 |
| | P- 30 | 3 | 4 | 3.696 |
| | P-101 | 4 | 3 | 4.112 |
| | P- 44 | 5 | 5 | 5.304 |
| | P- 67 | 6 | 8 | 5.797 |
| | P- 78 | 7 | 6 | 6.499 |
| | P- 27 | 8 | 13 | 6.987 |
| | P- 1 | 9 | 11 | 7.864 |
| | P- 12 | 10 | 7 | 8.355 |
| | P- 31 | 11 | 6 | 8.410 |
| | P- 18 | 12 | 10 | 8.841 |
| | P- 64 | 13 | 9 | 9.440 |
| | P- 60 | 14 | 10 | 9.814 |
| | P- 19 | 15 | 9 | 9.916 |
| | P- 10 | 16 | 9 | 10.106 |
| | P- 13 | 17 | 11 | 10.543 |
| | P- 62 | 18 | 13 | 11.117 |
| | P- 2 | 19 | 9 | 11.195 |
| | P-102 | 20 | 18 | 15.445 |
| | P- 95 | 21 | 12 | 17.133 |
| | P- 23 | 22 | 14 | 17.481 |
| | P- 73 | 23 | 28 | 23.716 |
| | P-114 | 24 | 23 | 24.605 |
| | P- 87 | 25 | 26 | 27.785 |
| | P- 74 | 26 | 32 | 32.957 |
| | P- 71 | 27 | 51 | 64.088 |
| GROUP B | P- 70 | 1 | 1 | 1.469 |
| | P- 15 | 2 | 1 | 1.791 |
| | P- 11 | 3 | 2 | 3.823 |
| | P- 46 | 4 | 2 | 4.601 |
| | P- 68 | 5 | 3 | 5.214 |
| | P- 22 | 6 | 4 | 6.993 |
| | P- 26 | 7 | 5 | 7.713 |
| | P- 21 | 8 | 5 | 8.107 |
| | P- 51 | 9 | 4 | 8.398 |
| | P-112 | 10 | 6 | 13.266 |
| | P- 82 | 11 | 8 | 13.361 |
| | P- 54 | 12 | 8 | 16.585 |
| | P- 3 | 13 | 8 | 16.978 |
| | P- 25 | 14 | 12 | 17.163 |
| | P- 80 | 15 | 9 | 17.276 |
| | P- 16 | 16 | 10 | 19.906 |
| | P- 40 | 17 | 17 | 24.377 |
| | P- 76 | 18 | 13 | 31.725 |
| | P- 45 | 19 | 18 | 34.118 |
| | P-104 | 20 | 15 | 35.390 |
| | P- 32 | 21 | 25 | 43.397 |
| | P- 77 | 22 | 24 | 56.482 |
| GROUP C | P- 52 | 5 | 1 | 3.142 |
| | P- 61 | 6 | 1 | 3.498 |
| | P- 97 | 7 | 1 | 4.344 |
| | P- 72 | 8 | 3 | 7.212 |
| | P- 59 | 9 | 3 | 7.448 |
| | P- 43 | 10 | 2 | 7.723 |
| | P-103 | 11 | 3 | 13.289 |
| | P- 4 | 12 | 6 | 14.639 |
| | P- 88 | 13 | 5 | 16.933 |
| | P- 37 | 14 | 5 | 16.996 |
| | P- 47 | 15 | 5 | 18.116 |
| | P- 41 | 16 | 6 | 20.911 |
| | P- 75 | 17 | 6 | 21.636 |
| | P- 29 | 18 | 7 | 21.997 |
| | P- 49 | 19 | 6 | 25.447 |
| | P- 48 | 20 | 8 | 26.178 |
| | P- 34 | 21 | 6 | 26.899 |
| | P-111 | 22 | 8 | 27.925 |
| | P- 89 | 23 | 8 | 33.182 |
| | P-107 | 24 | 9 | 41.323 |
| | P- 14 | 25 | 10 | 42.089 |
| | P- 33 | 26 | 14 | 45.553 |
| | P-113 | 27 | 23 | 67.896 |
| | P- 50 | 28 | 16 | 72.058 |
| GROUP D | P- 7 | 12 | 1 | 5.502 |
| | P-118 | 13 | 2 | 14.082 |
| | P- 53 | 14 | 2 | 16.707 |
| | P- 66 | 15 | 1 | 16.932 |
| | P- 81 | 16 | 3 | 17.395 |
| | P-117 | 17 | 3 | 18.097 |
| | P- 36 | 18 | 2 | 19.301 |
| | P- 6 | 19 | 4 | 19.532 |
| | P- 85 | 20 | 1 | 21.494 |
| | P- 65 | 21 | 2 | 23.363 |
| | P- 90 | 22 | 3 | 26.465 |
| | P-116 | 23 | 6 | 31.194 |
| | P- 8 | 24 | 3 | 32.070 |
| | P- 42 | 25 | 4 | 35.086 |
| | P- 80 | 26 | 7 | 35.156 |
| | P- 94 | 27 | 6 | 38.152 |
| | P-106 | 28 | 7 | 40.611 |
| | P- 99 | 29 | 4 | 43.002 |
| | P- 98 | 30 | 7 | 45.275 |
| | P- 24 | 31 | 7 | 53.158 |

**Division II**

| | | | | |
|---|---|---|---|---|
| R-20 | 6 | 2 | 3.417 |
| R- 3 | 7 | 1 | 7.062 |
| R- 1 | 8 | 2 | 8.588 |
| R- 5 | 9 | 5 | 8.849 |
| R-11 | 10 | 1 | 9.246 |
| R-18 | 11 | 2 | 10.712 |
| R- 2 | 12 | 6 | 12.378 |
| R- 6 | 13 | 9 | 13.233 |
| R-21 | 14 | 8 | 15.297 |
| R- 9 | 15 | 2 | 15.332 |
| R-14 | 16 | 3 | 25.398 |
| R-10 | 17 | 10 | 29.303 |

No Jan. report: P-32, P-34, P-36, P-37, P-74, P-75, P-88, P-89, R-5.

Withdrawn: P-79, P-83, R-16, R-17.


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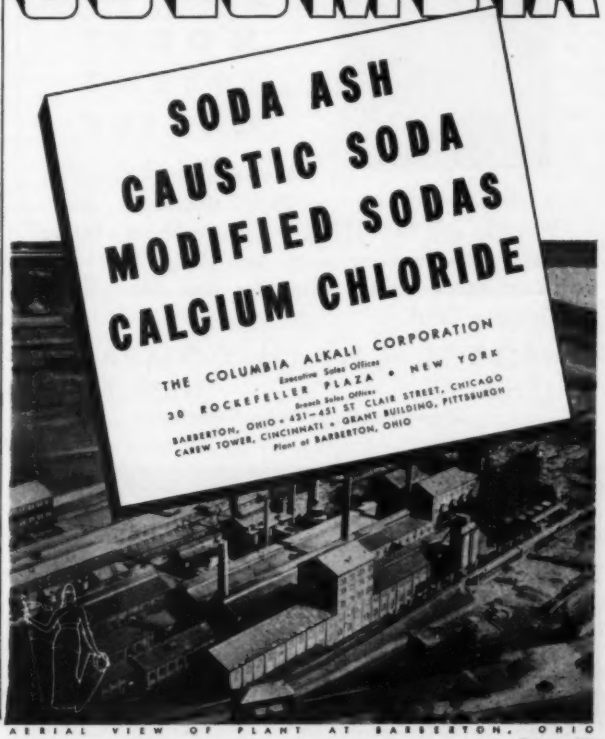
# COLUMBIA

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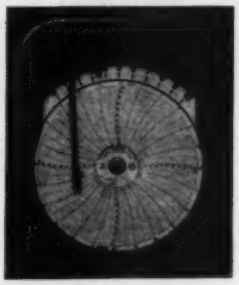

*Above is shown indicating, recording and integrating Electric Flow Meter*

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THE NEW **FULTON SYSTEM**
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*Write for Bulletin No. 40.*

**Midwest-Fulton Machine Company**
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# POWER

## GENERATION + UTILIZATION + MAINTENANCE

**This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.**

By W. S. JOULE

### ◆ Tightening Commutators

It is important that commutators be kept tight. A good way to test for tightness is to tap the commutator with a hammer. If a dull sound instead of a ring is heard, trouble probably will develop, if it has not already done so. Another evidence of looseness is a white chalky substance sifting out from between bars. This is powdered mica caused by vibration of bars and consequent chafing of the mica. This vibration may lead to fatigue cracks and ultimate failure of the bars. Small commutators are best tightened by putting the armature in a lathe and fitting a special wrench or key to the commutator nut or bolts, supporting the end of the wrench against the tail stock if necessary and screwing it up.

◆ TILTING TRAPS used for boiler feeding and other purposes are liable to give much trouble if not kept in first-class condition always. This statement applies to the trap and its pipe connections, such as the steam connection from the boiler to the trap and the discharge from the trap to the boiler, stop, check valves, etc., also the exhaust or vent line must be looked after frequently, that all may be clear to prevent trouble.

### ◆ Bridge Walls Should be Rugged

One important point in furnace design which not only affects efficiency but also increases the maintenance cost of an installation, if not properly laid out, is the bridge wall. The height must be correct for the particular setting and fuel to be used and, at the same time, the construction must be of a type that will not give trouble in operation.

In building a bridge wall, some arrangement must be made for taking care of expansion. If the wall is built in solid to the side walls, the resulting thrust is liable to crack the setting.

Bridge walls are usually faced with first-grade fire brick for one or two layers, then second-grate fire brick and common brick is used for filler. In some cases, however, plastic refractory is used for the facing.

Usually the bridge wall is of heavier construction than the side walls, particularly for hand-fired furnaces where the wall may get a good deal of battering from the firing tools.

As the height depends on the coal which is used, it is not possible to give any definite figures. For anthracite, the bridge wall in the case of return tubular boilers is higher than for a furnace designed for burning bituminous coal as the volume of gases is larger.

◆ WHEN A NUMBER of boilers are served by one breeching a great deal of draft trouble may develop unless the boiler dampers are all equalized to the same draft. To accomplish this all the fires should be brought to the same condition as to thickness and freedom of holes and thin spots. Each damper can then be adjusted to the standard draft and thereafter the main damper at the stack need be the only one regulated to take care of the changes in load condition.

### ◆ Improvements in Manufactured Equipment

Back of every change in design of a manufactured device is an idea born of a desire either to improve the usefulness of the device or to reduce the cost of its manufacture. If such a change accomplishes either result, both the manufacturer and the user are benefited, with the greatest advantage to the user in lower cost of investment or improved efficiency, either one of which has a cumulative financial return to him.

Although many improvements have been made in power plant equipment during the past few years, resulting in enormous gains to those who have been foresighted enough to employ the most modern equipment, only a part of the credit for originating such improvements can be claimed by the users. Practically all the initiative has been taken by manufacturers who have spent great sums of money not only in developing their products but in putting them on the market, making them available in all parts of the country, creating a demand for equipment with which the user is not familiar and teaching those in charge of operation how to secure the highest efficiency from this equipment.

Here is an opportunity of which many operators have failed to avail themselves. No manufacturer's laboratory can duplicate all the conditions of operation met in the field. Each installation has its pecularities and an observant operator could, if he would, point to improvements in details which manufacturers would welcome and consider, if their application is sufficiently general. Step into any well operated plant and you will find original ideas, which should be available for use in other plants, worked out successfully by the man in charge. To develop these ideas into manufactured equipment is, in most cases, out of the field of the operator, but, by supplying data gathered during operation, he can be of great service to the manufacturer who undertakes to put the device on the market.

It is gratifying to note a growing tendency toward co-operation between manufacturer and user. This is a step in the right direction and should receive all possible encouragement.

### ◆ Effect of Water Level

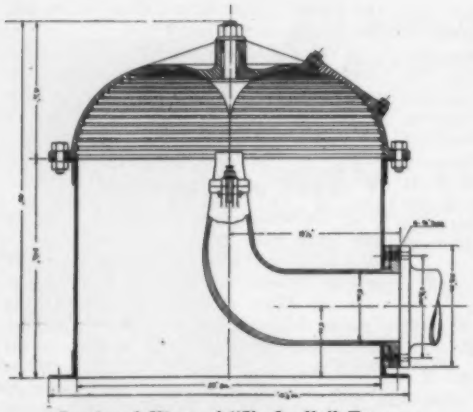
If the water level is carried high in the glass, the boiler will be slow in steaming; on the other hand the greater water content will mean a greater storage of heat which, with fluctuating loads, will be an advantage. A disadvantage arising from a high water level is that the boiler is likely to prime when a bituminous coal fire is stirred up or when there is a sudden demand for steam. This condition is caused by the decreased steam space and the decreased steam disengaging area or water surface. The smaller the area of the water surface, the greater will be the volume of steam which must be liberated per unit of area. This causes a more violent agitation of the water surface with a result of entrainment of water in the steam. A high water level also cuts down on the steam space so that not only will the distance from the water surface to steam nozzle be less, but the steam velocities within the shell will be higher than if the water were carried at a lower level. The result is that the entrained water is not given time to settle out but is rapidly carried to the steam nozzle and out of the boiler.

As the water level is lowered in a boiler, the water surface is increased because it approaches the center of the boiler where the area would be the largest possible within a cylinder. This increase results in a lower volume of steam to be freed per unit of water surface so that a steadier water surface is obtained with less tendency for the boiler to prime. In ordinary practice, it will be found that a boiler will maintain a steady water level, produce commercially dry steam and steam quickly, if the water level is maintained from 2 to 4 in. above the bottom of the glass.

*Announcing...*

# A NEW "UMBRELLA" TARGET *for* HYDRAULIC BEATING SYSTEMS

## *Also the acquiring of Witham U. S. Patent Number 2,000,268*



*Sectional View of "Umbrella" Target—Patent Applied For*

**Because the standard beater roll and Jordan plug are generally known to be most inefficient as recirculators with a tremendous non-effective load factor, many pulp and paper mills have installed the Hydraulic Beating Systems to *increase production* with *less power* for different applications. This System comprises an exceptionally efficient Pump for recirculation together with the Target. And now with the development and proved results of the new "Umbrella" Target for applications to headbox, chest or beater, still greater operating efficiency and economy advantages are attained, such as the following:**

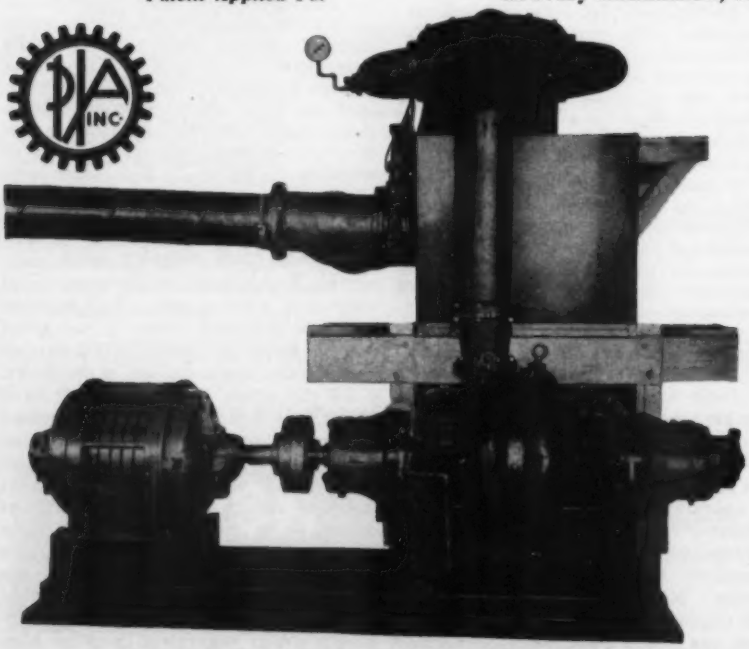
**Improves finish and printing quality of paper making stocks.**

**Most efficient and effective for pretreatment of raw pulps.**

**Most economical in the handling of broke and waste papers.**

**In every installation, where the Target is used, production has been increased and power reduced. For example, one Pacific Coast user writes:**

**"At the moment time does not permit covering with any degree of detail the results we are obtaining from the Bale Pulper and the two 6" targets, excepting that the tandem 6" target arrangement for Jute Liner Filler Stock appears to be working out satisfactorily, and offhand, has permitted us to shut down four 1500-lb. beaters, one 15-H.P. pump, one 20-H.P. pump and one 150-H.P. jordan. The four beaters were operating at 80-H.P. each, making a total H.P. saving of a little over 300, with approximately 10% better stock from a slightly cheaper formula."**



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# TECHNICAL DEVELOPMENTS

**The following abstracts are of the latest developments found in the foreign press.**

## IN THE PAPER INDUSTRY

### ◆ Condensate Regulating Valve for Drying Cylinders

The new valve design, it is claimed, overcomes the usual inherent difficulties and the valve may be installed in existing steam trap systems, from which steam traps may be removed subsequently. Figure 1 shows the valve fitted to a combination steam and exhaust packingless gland at the back of the machine. Details of the valve (A) which is manufactured in various sizes, are shown in Figure 2. (A) is operated by the steel cam (B), which is fastened to the journal end by the existing studs. When (B) revolves with the cylinder it acts on the ball-fitting (C) which is screwed to the end of the sliding valve spindle, and which gradually pushes the valve disc (E) off its seat. This process continues until (C) is at the apex of (B), (i.e. when the valve is open entirely). From this point on (B) gradually releases (E) which is pushed firmly against its seat by spring (D), located back of the valve. As shown in Figure 1, the water-lifting bucket (F) is given approximately a 20 degree lead from the apex of (B) so as to permit the condensate to flow through the journal and reach (A) when it is open. (A) is made of gun metal, with a spindle of stainless-steel, a phosphor-bronze spring and ball, and a fibre valve disc. Corrosion is thus eliminated and erosion is slight. A sight glass (shown in Figure 2) allows the observer to determine the correct opening of the valve. Empirical tests show that when the arc of (B) is 120 degrees, best results are normally obtained. (C) may be screwed either clockwise or counterclockwise, thus shortening or lengthening the valve spindle. In the former case the arc of (B) and the period for opening (A) will be reduced. This adjustment provides for variations in the quantity of condensate in different cylinders. When once fitted and adjusted for an individual cylinder (A) will serve satisfactorily for a reasonably wide variety of papers without further adjustment, if the speed of the paper machine, and not the steam pressure, is regulated to suit the amount of water evaporation required. In making heavier papers, the machine speed is reduced; in lighter papers it is increased. The valve also prevents air from accumulating in the cylinders, since the ball-fittings may be adjusted so that only a small amount of steam-air mixture is permitted to escape with the condensate.

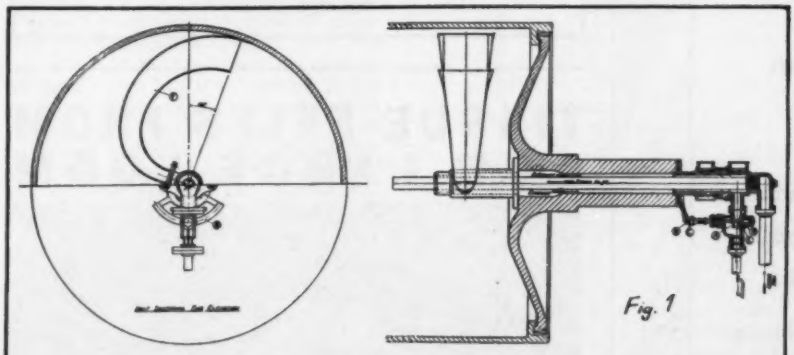

Fig. 1

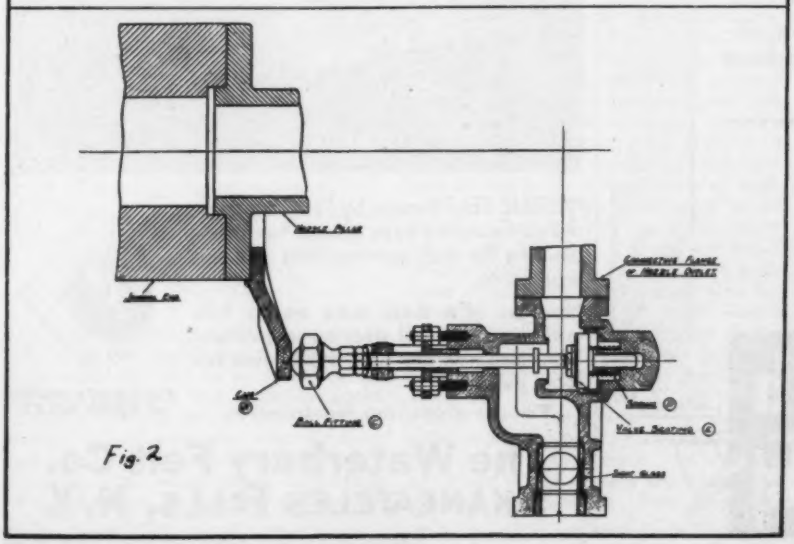

Fig. 2

In a paper mill in which there are two large machines of the same design, one machine (1) was fitted out with the new condensate regulating valves, while the other (2) was left intact with its system of efficient steam traps of the float type, and served as a control. Tests were carried out on the dryers of each machine over a six-hour period. The respective furnish substance, speed, moisture content of sheet after the last press, and after the last dryer, total water evaporated on the dryers and the total output were held as nearly identical as possible in either case. Steam consumption was measured separately. Machine (1) consumed 22,300 pounds of steam while (2) used 23,900 pounds. This would represent a saving of about 6 per cent, due largely to the new valves. Allowing for errors in the steam meters, a saving of 4 per cent was obtained. Considerable steam loss in (2) is due to the fact that air vents on the steam traps must be opened when starting and kept open for at least an hour, and to the losses when air is released through vents on the traps during the running of the cylinders. Paper-Maker and British Paper Trade Journal. 90, No. 5 (T. S.) 169-172 (1935).

### ◆ Experiments in Printing

In the following experiments, a small, hand-driven proofing press was used. This is illustrated in Figures 1 and 2. The heavy travelling bed (A) carrying the inking table (B) and a subsidiary bed (F), runs on rollers (G) over rails that are fixed to the main frame (H) of the press. (F) is supported on wedge shaped bearers, is finely adjustable and carries the block (I). On either side of (A) are the flat bearing surfaces (J) against which the cylinder is held both by its weight and its shaft support (K) which is fixed to (H). This cylinder and (A) carry teeth, the pitch line of which corresponds to the level of (J). These serve to drive (A) under the cylinder, when this is rotated. ($C_1$), ($C_2$), and ($C_3$) are inking rollers carried in adjustable bearings. Of these

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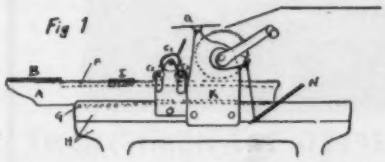
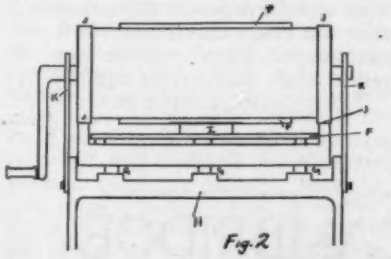
**SKANEATELES FALLS, N.Y.**

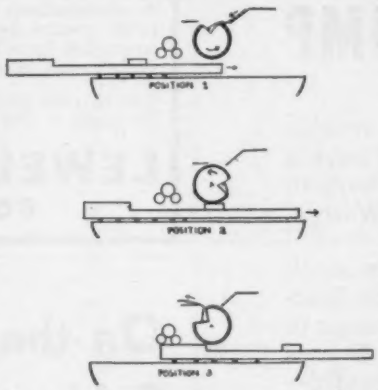
($C_1$) is made of steel, driven by a pinion, and this serves as a frictional drive for the gelatine composition rollers ($C_2$) and ($C_3$). The lever (P) permits the rollers to be lifted out of contact with the block and separated from each other. Thus the inking operation may be suspended temporarily. That part of the cylinder which corresponds to the printing area of (A), is 40 thousandths of an inch less in radius than that end portion



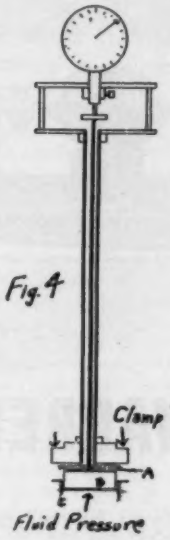

which runs on (J). The gap which is thus left over (I) is filled with packing material (P) to give the suitable pressure between the paper and the printing area. A part of the cylinder is cut away and carries devices for fixing (P) and grippers for carrying the paper sheet. Cam action serves to open and close the grippers at the best points for feeding purposes. Micrometer guides on the cylinder and feed board permit the paper to be placed with precision, when register is required. The lever (N) operates an eccentric in (K) which lifts the cylinder. During the return stroke after printing, this is done automatically. The other, less important devices common to printing presses are also present, but are not shown diagrammatically. Figure 3 illustrates the printing operation [Cf, also figures (1) and (2)]. (1) is brought to the level of the bearers by means of (F), suitable packing is put on the cylinder and ink distributed on the ink plate and ($C_2$) and ($C_3$). In position 1 (Figure 3), the grippers are open and ready to grasp the paper. As the cylinder rotates, (A) travels forward and (1) after being inked by ($C_2$) and ($C_3$) passes under the cylinder and the paper (as shown in position 2, Figure 3) and printing take place. Position 3 of Figure 3 illustrates the end of the stroke with the paper delivered to the special supports, and the grippers opening at just the right moment. At the same time, ($C_2$) and



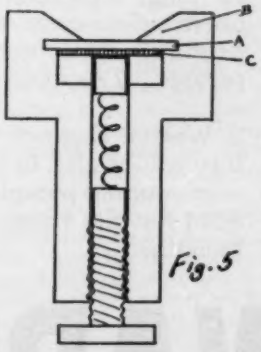

($C_3$) are receiving a fresh supply of ink from the table, and the cylinder lifts, ready for (A) to be run back for the next printing. The maximum speed at which (A) can be run is 200 feet per minute (which compares with commercial press speeds of 120-1,000 feet per minute). The experiments (described in detail) gave an insight into the essential factors of printing: e. g., type surface, ink film, the surface of the paper, and the pressure. The pressure and ink film were measured and so controlled that different papers could be compared for their printing qualities. The ink deposits show irregularities when examined under the microscope. (Photomicrograph of individual letters and reticulated ink films are given in the original article.) These irregularities are responsible for the general appearance of the print. From the experimental evidence it appears that uninked areas are probably due to lack of contact between the paper and the ink film, because of their respective contours at the instant of printing. Wetability and surface tension effects appear to be relatively unimportant. The experimental press permits the prediction of the behavior of different papers on a commercial press, especially with regard to depth and evenness of printing, strike-through, and (to a lesser extent) set-off. As yet these properties do not lend themselves to quantitative, objective ex-




pression, and an estimate of the results of printing is still a matter of comparison and personal opinion. The author suggests the possibility of measuring the over-all depths of black or color photometrically. An instrument permitting such measurements (which is not as yet available) would allow the determination of average blackness of the inked surface, inherent transparency of the paper, extra show-through due to penetration, and set-off properties (provided standardized ink, ink-film, and pressure were used). However, even if such an instrument were available, qualities such as the general appearance of halftone printing would still have to be evaluated subjectively. In an appendix the author describes a device for measuring compression of paper at high pressures (Figure 4) and an apparatus for viewing the surface of paper under pressure (Figure 5). In Figure 4, the paper (A) (20-30 thicknesses) is placed between two circular metal blocks, the lower one of these (B) fitting over a Mullen tester diaphragm (C), and the upper one being held by a clamp. When fluid pressure is applied, the relative movement of the discs is communicated to a dial micrometer. This is accomplished by means of a tube which passes through a hollow clamp spindle, the lower end of which is attached to the upper of the two metal blocks. The upper end of the tube, by means of a frame, supports the body of the micrometer. (B) in Figure 4, carries a rod passing through a hole or slot in the




paper and then through the tube, and contacts the foot of the micrometer. Rod acid tubes may be unscrewed so as to put the various parts into place. The micrometer has a sensitivity of 0.0001 inch, and in general readings may be duplicated by 0.0005 inch. A board testing Mullen permits pressures up to above 600 pounds per square inch. In Figure 5, a glass plate (A) is held by jaws (B), so shaped that a microscope objective can approach (A). Against the latter is pressed the paper sample (C), by applying a plunger, spring and screw. The pressure up to 100 pounds per




square inch may be determined from compression of the spring. When a narrow beam of intense light is projected on the end of (A) in a direction normal to the plane of the diagram, the points of contact between (A) and (C) appear bright against a black background. Seventeen recent literature references are given. P. H. Prior. Paper-Maker and British Paper Trade J. 90, No. 4 (T. S.) 155-160; No. 5 (T. S.) 164-6 (1935).

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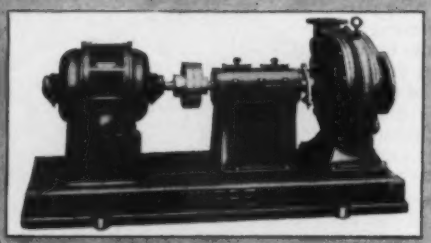

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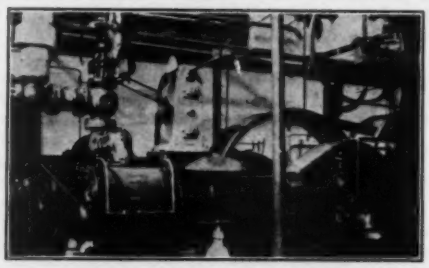

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## ◆ Resins in Sulphite Pulp

Of all modes of combatting pitch troubles, the mechanical methods seem to the present author to hold the greatest promise. G. Hall (in 1930) claimed that most of the resin remaining in the stock was not associated with the fibers but with the medullary wood rays. This finding was confirmed in 1934 by Edge, and also by Lampén. By the removal of such cells, through the use of suitable screens, the rosin-content dropped appreciably. Lampén's rotating screens and thickeners are based on this principle. The author describes the method and equipment devised by Hägglund for the removal of rosin. According to his claim, the resin content of pine and spruce sulphite pulp may be reduced materially. This equipment (details of which are not given in the abstract) is now being installed in a number of sulphite pulp mills. By passing a pulp suspension of low stock density several times through a thickening device, rosin content of the pulp may be lowered beyond the (so-called) critical point. The ratio of fiber to water prior to this thickening is 1:300. After the thickening it is 1:100. There is naturally a loss in stock (which, although it may be recovered, is valueless). This mechanical treatment lowers the rosin content so materially that pitch troubles in the paper mill are reduced to the minimum, and the pulp obtained in this way is always purer and whiter. Experiments showed that the lowered rosin content which apparently results from protracted drying of the wood is correlated not only with loss of moisture but with concomitant oxidation. Rapid, artificial drying of chips, at relatively low temperature, therefore probably has little effect in causing a decrease in the rosin content. S. Samuelsen. Papir-J. 23, 63 (1935), through Papier-Fabr., 33, No. 49 (Abstracts), 201 (1935).

## ◆ Improved Power Transmission by Flat Belts

The device is the so-called Schütz kraft-ring (power-ring) and the method of adfixing it to a pulley is schematically illustrated in Figure 1. The steel ring (a) carries an outer layer (c) made of a special grade of leather having very high frictional qualities. By the use of two wedge bands (b) each ring may be sprung into place firmly and permanently. The addition of these power rings increases the pulley diameter by about 15 mm. Since the rings have a uniform width of 60 mm., one ring per 70 mm. width of belting is normally used. The friction between the leather of the ring and the belt, is almost double of that between the belt and the bare pulley. Hence greater h. p. is transmitted without slippage. A number of improvements (prior to the introduction of power rings) in surfacing pulleys or belts have been made within recent years. Among them may be cited V-ropes running in wedge shaped grooves of the pulley, as in the case of normal bare pulleys, whereas such lifting is entirely feasible in the case of a pulley equipped with power rings. Furthermore the tension on the slack side of the belt may be reduced to almost zero, without fear of power transmission loss in the case of the tight side. It also becomes immaterial whether the slack

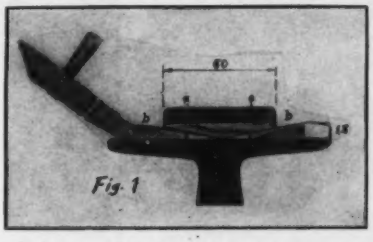

Fig. 1

side is above or below, since its location has a negligible effect on transmission. Other advantages claimed for the power ring are: (1) the possibility of installing vertical belt drives, (2) short distance between centers of the driving and driven pulleys, (3) idler pulleys become

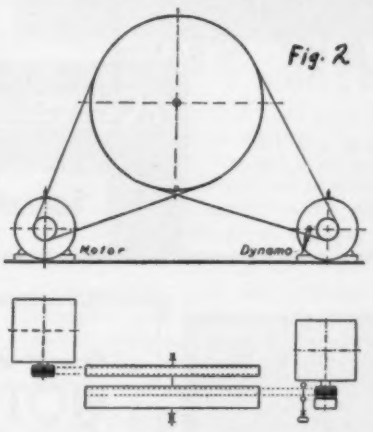

Fig. 2

unnecessary, (4) they are practically unaffected by abnormally high humidity. A recent demonstration, which is illustrated schematically in Figure 2, was carried out at the Leipzig Spring Fair. It will be noted that the belt driving the counter shaft from the dynamo could be

Fig 3

run either on a bare pulley or on one equipped with power rings. Otherwise the conditions were identical. The experiment showed that the greatest output obtained with the bare pulley was 5 kilowatts, whereas with the kraft-ringed pulley yielded 8 kilowatts. A dynamo drive, showing application of the power rings (of which there are 5 on the pulley) is illustrated in the halftone, Figure 3. Diagrammatic illustrations showing drives for a chippers, calender, and kollergang are given in the original. Ernst Preger. Wochbl. Papier-Fabr. 66, No. 47, 888-90(1935).

## ◆ Waste Wood Carbonization

The following is of interest to pulp and papermakers due to the possible utilization of waste products suggested by the authors. By heating waste wood chips under pressure at 180 degrees C. with a solution of inorganic salts that generate acid, or with neutral salts pretreated with small amounts of acid, the authors were able to cause the wet carbonization of hard and soft woods within 8 hours. Methanol and volatile acids (largely acetic acid) are generated, and no tar was formed in the process. Chips (20x10x5 mm.) were treated with the saturated salt solution, in an autoclave. Gas, indirect, or direct steam may be used as a means of heating. When the highest temperature is reached (180 degrees), small amounts of vapor are regularly discharged through a suitable valve, and these vapors are then condensed. Subsequently, the salt solution is drained off, and the residual carbon washed with water, and then heated with steam, which is also subsequently condensed. Methanol yields varied very widely. They are in general lower than those formed in the case of destructive distillation of hardwood, but higher than those obtained when softwoods are distilled. On the other hand, acetic acid yields are invariably much higher than those found respectively in the destructive distillation of either hard or softwood. The yields of acetic acid increase with rising moisture content of the wood, but also with the amount of acid used in the wet carbonization. In the case of hardwoods, it is possible to obtain 9 per cent yields of acetic acid (in contrast to 6 per cent obtained by destructive distillation of the same species). Heating wood under pressure with aqueous acid but without salt addition gives rise to lower yields of acetic acid. Formic acid, in appreciable amounts is obtained only when the water content of the wood and acid concentration are very high. Higher fatty acids (like butyric acid) were obtained in traces only and no acetone was obtained. Although tar was absent, 2-4 per cent of pale yellow oil was obtained, of which about 50 per cent consisted of furfural. Higher ketones were also present, as well as very minute quantities of turpentine oil. The residual carbon belongs to the so-called red charcoal variety. The mechanism of wet-carbonization is then discussed. After a thorough saturation of woody tissues with $MgCl_2$ solution and HCl, a hydrolysis takes place, at about 150 degrees C. This first affects the hemicelluloses of the wood, and then the cellulose with the formation of sugars, which are then converted, in part, into acetic acid. The

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fact that hardwoods yield much more acetic than do the softwoods, is due to the higher percentage of acetyl groups. The action on lignin is primarily a fission of methoxyl groups, giving rise to methanol in the distillate. The wet-carbonization at 180 degrees C. is not comparable to dry distillation at 270 degrees since the reaction proceeds much more gradually and regularly than in the former case. In other experiments, the carbonization was carried out without the use of pressure. Here sawdust was soaked in 35 per cent $MgCl_2$ solution, and converted to charcoal at 180-200 degrees within an hour. At the end of this period, there is no further evolution of gases or vapor. Under these conditions, approximately the same amounts of charcoal was obtained from spruce, pine, and beechwoods (i. e., 60 per cent); and the yield of acetic acid was about 4-4.5 per cent in most cases. The charcoal is much more compact than in the case of pressure treatment (i. e., that leading to red charcoal). The authors also discuss technical questions and equipment required for putting their methods into larger scale production. Carl G. Schwalbe and Karl-Erik Neumann. Agnew. Chem. 48, 207 (1935), through Papierfabr. 33, No. 49 (abstracts) 208-9 (1935).

### ◆ Nitric Acid on Wood

After reviewing the literature, the author reports on his laboratory experiments. Aspen wood, when heated under reflux condenser with 15 parts of 7 per cent $HNO_3$ at 98 degrees gave a pulp yield of 54 per cent. After treatment with 0.05 to 0.25 per cent aqueous NaOH, this pulp is readily bleached, has a low ash content (0.07-0.13 per cent) and yields a fair grade of paper. However, the viscosity of such pulp is lower than that of sulphite. The liquors from this $HNO_3$ digestion yield about 10-13 per cent pentosans (pentoses? abstractor); 4-6 per cent volatile acids and 3-4 per cent oxalic acid. Other cooking conditions under ordinary pressure, with the resulting products are also described. Soletschnik. Bumazhnaya Prom. (The Paper Ind. U.S.S.R.) 14, No. 4, 30 (1935) through Papierfabr. 33, No. 48 (Abstracts), 195 (1935).

### ◆ Chlorinated Rubber Paints in Preventing Corrosion

The author outlines very briefly the uses, application, and drying of such paints. While they prevent corrosion, such coatings are affected by long contact with aqueous solution above 65 degrees C., as well as by certain organic solvents. When admixed with colored pigments, chlorinated paints are quite light fast (although the unpigmented paint is affected by ultra-violet light). Brickwork, wood and concrete are protected against moisture and the action of aqueous solution by chlorinated rubber paints. Schultze. Wochbl. Papierfabr. 66, No. 48, 907-8 (1935).

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2,024,248—Paper Treating Means. Harold Robert Rafton, Andover, Mass., assignor to Raffold Process Corporation, a corporation of Massachusetts. Application November 1, 1932. Serial No. 640,714. 3 Claims. (Cl. 91—55.) Apparatus of the character described comprising a casing having restricted communication with the atmosphere whereby the interior of the casing remains substantially at atmospheric pressure, said casing having means for continuously feeding a paper web therethrough, means in said casing for applying to the web a solution of a material dissolved in a volatile solvent, heating means for the paper web after said solution has been applied thereto by said applying means, an eduction duct communicating with said casing, means for recovering solvent evaporated from the web, a conduit having its inlet arranged to receive gaseous fluids which have passed said recovery means without having been recovered thereby, said conduit having its outlet end connected to the atmosphere, means operative for producing an eduction current through said conduit, a recovery container connected to said duct to receive recovered solvent therefrom, a solution container connected with the recovery container and having means for supplying additional material thereto, a supply container, means for transferring solution from said solution container to said supply container, and means for transferring solution from said supply container to said solution applying means.

2,024,618—Spreading Device. William Whiting, Holyoke, Mass., assignor to Whiting Paper Company, Holyoke, Mass., a corporation of Massachusetts. Application December 13, 1934. Serial No. 757,355. 5 Claims. (Cl. 271—2.6.) A spreading device for webs of paper comprising a pair of rolls positioned in end to end relation across the path of travel of the web, a pair of spaced bearings for each of the rolls, the adjacent ends of the rolls being extended beyond their respective adjacent bearings to position the ends of the rolls closely together, each roll being independently pivoted to swing about an axis normal to the web, and means to swing the rolls about their pivots.

2,024,635—Process of Producing Multi-Layer Paper, Cardboard, Pasteboard, Boxboard and the Like, and Product Thereof. Ernst Fues, Hanau-on-the-Main, Germany, assignor to Anthony William Deller, Brooklyn, N. Y. Application August 26, 1932. Serial No. 630,532. In Germany July 27, 1931. 10 Claims. (Cl. 92—40.) The process of producing integral paper product which comprises forming a hydrated cellulosic slippery mass having a fibrous structure and containing a mineral filler, applying said mass to the surface of a wet paper web, and finishing said web to form an integral product.

An improved integral multi-layer paper unit comprising a plurality of layers of paper having a dense mixture of finely divided and hydrated mass of cellulose of fibrous character containing an excessive amount of mineral filler incorporated between said layers and on at least one outer face of said layers, said layers and said hydrated mass of cellulose of fibrous character being amalgamated together into an integral unit.

2,024,932—Apparatus for Tip Gluing Paper Sheets and the Like. William H. Kushera and Fred M. Brackett, Topeka, Kans., assignors to The Brackett Stripping Machine Company, Topeka, Kans., a co-partnership consisting of Edward M. Brackett and Fred M. Brackett. Application May 18, 1934. Serial No. 726,320. 8 Claims. (Cl. 154—42.) In a machine of the character described, the combination of means for conveying a pair of superimposed sheets with the edge of one sheet in registry with the edge of the other sheet, means for separating the registered edges of the sheets, means for lifting the upper sheet including means for forming a curved ridge adjacent the edge of the sheet to expose an underlying edge of the other sheet, and means for applying glue to said exposed edge for securing said lifted edge when the lifted edge is disengaged from said lifting means.

2,025,275—Joint for Paper Drier Felts or Aprons or the Like. James K. Diamond, Grand Rapids, Mich., assignor to Clipper Belt Lacer Company, Grand Rapids, Mich. Application July 27, 1935. Serial No. 33,432. 11 Claims. (Cl. 24—33). A joint for the meeting ends of a drier felt or apron or the like comprising joint flaps secured in superimposed relation upon the meeting ends of the apron, a coupling means carried by the joint flaps, and a flexible joint sealing element disposed between the superimposed ends of the apron and joint flaps and acting to close the joint against the passage of steam and vapors therethrough.

2,025,788—Coating Composition. Joseph H. Swan, 3d, Middletown, Ohio, assignor to The Gardner-Richardson Company, Middletown, Ohio, a corporation of Ohio. Application November 18, 1931. Serial No. 575,756. In Canada August 21, 1931. 3 Claims. (Cl. 134—17). In the manufacture of a greaseproof paper sheet, the method of preparing a coating composition for application to a paper sheet which comprises forming an alkaline water solution of casein, forming a separate water solution of a formaldehyde, adding the formaldehyde solution to the casein solution in small amounts while agitating the latter to maintain the solution characteristics of the casein and to provide a mixed solution containing of the order of 10% by weight of formaldehyde on the dry weight of the casein, and adding the casein-formaldehyde solution to rubber latex emulsion with agitation to avoid coagulation of the latex.

2,026,253—Sheet Material and Method of Manufacturing the Same. Joseph Raymond Sanborn, Cambridge, Mass., assignor to International Paper Company, a corporation of New York. Application March 14, 1935. Serial No. 11,168. 14 Claims. (Cl. 92—39). As a new article of manufacture a sheet formed from growths formed from slime producing micro-organisms. A method for the manufacture of formed material which comprises digesting growths formed from cultures of slime forming micro-organisms with a zinc chloride solution to form a viscous mass, and regenerating said mass with water into the desired form. As a new article of manufacture for use as a filler in the manufacture of paper, a mass of material produced from growths formed from cultures of slime forming micro-organisms.

2,026,284—Method and Apparatus for Bundling and Packaging Articles. Benjamin H. Metternich, Menasha, Wis., assignor to Marathon Paper Mills Company, Rothschild, Wis., a corporation of Wisconsin. Application September 28, 1934. Serial No. 745,873. 6 Claims. (Cl. 93—93). In mechanism of the class described, the combination of a blade-like fixed stop plate, a movable stop blade adapted to be moved toward and from the fixed stop plate to exert compression upon a stack of sheets and permit insertion of a pre-formed sleeve around the stop plate and blade, and a lifting plate located below the stop plate and blade in position to support the base edges of the sheets stacked between the plate and blade and movable to force the same upwardly within the space between the plate and blade while in compressing relation and within the confines of the sleeve surrounding the plate and blade, the parts being configured to permit removal of the stack with the surrounding sleeve.

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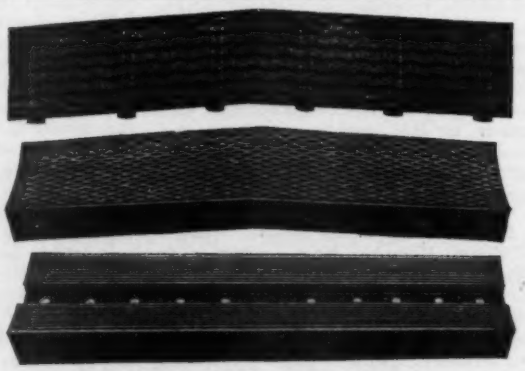
**Wood Room Equipment**

Slashers — Chippers
Barking Drums — Chip Screens
Wood Cleaner — Chip Crushers

D. J. Murray Mfg. Co.

WAUSAU ~ WISCONSIN.



## A Product of Long Experience . . . . . .

The paper industry's first choice when it comes to *beater bars* and *bed plates*. All standard patterns and all practical special patterns. Designs born of many decades of mill contacts; quality the result of long metallurgical experience.

Also manufacturers of paper trimming knives, rotary cutter knives, wood chipper knives, pulp shredder knives, rag cutter knives, roll-bar grinders, Dayton abrasive wheels for knife grinding.

SIMONDS WORDEN WHITE CO.

DAYTON, OHIO

Factories at DAYTON - BUFFALO - CLEVELAND - BELOIT

# The COMMERCIAL OUTLOOK

New York, March 2, 1936.

IT WAS agreed generally among the hundreds of paper manufacturing executives who were in New York City attending the annual convention of the American Paper and Pulp Association and affiliated organizations that fairly rapid strides were made by the industry during 1935 in respect to increased mill operation and production growth. Speakers at the convention brought this out, and commented on it as emphasizing that the paper manufacturing industry has gone a far ways in pulling out of the depression, and is now in a decidedly healthy state insofar as concerns demand for the industry's product, the scope of manufacturing activity and the gradual rise in the production level.

Paper production in the United States during the last calendar year, taking in all grades and board, reached an estimated total of 10,307,000 net tons, according to statistics compiled by the American Paper and Pulp Association, representing a rise of 1,120,774 tons, or 12.2 per cent, over the aggregate of 9,186,226 tons of all grades produced in 1934 as reported by the U. S. Census Bureau in its annual summary on the industry. Production last year was at 74 per cent of mills' rated capacity for producing a total of 13,898,850 tons, contrasted with production at the rate of 66 per cent of capacity in 1934.

Domestic output of newsprint paper during 1935 is estimated at 939,000 tons, against 989,705 tons in 1934; of writing paper, 480,500 tons, against 414,542 tons; of book paper, 1,194,000 tons, against 1,055,247 tons; of wrapping paper, 1,570,000 tons, against 1,357,438 tons; of tissue paper, 425,000 tons, against 398,770 tons; of building paper, 426,000 tons, against 327,866 tons; of cover paper, 20,500 tons, against 17,011 tons; of paperboard, 4,693,000 tons, against 4,073,309 tons, and of miscellaneous grades, 559,000 tons, compared with 452,338 tons in 1934.

The one drawback in an otherwise healthy and encouraging situation in the paper industry is that prices of most classes of paper are on relatively low levels, having failed to keep pace with the general improvement in demand and production, with the result numerous mills are operating on a fairly large scale and yet realizing little or no profit. As brought out at the convention, unless the industry revises its ways in some directions, it is quite likely a period of "profitless prosperity" may be experienced, which, it might be added, would prove of scant nourishment to paper manufacturers in view of what they have gone through in the past few years. Prices of paper, it was usually agreed, are well stabilized and are at least holding steadily to established levels, but in many cases are not high enough to show mills a return.

Reports from the trade tell of a consistently good demand developing for paper of virtually all kinds, with buying gradually expanding in most quarters. There has been some seasonal slowing in some divisions of the market during the exceptionally severe weather in February, but trade expectations are the call for paper supplies will undergo further increase as the spring draws on and consumers and converters swing into one of their busiest periods of the year.

Newspaper advertising in the month of January registered a decline of 6.6 per cent from December, representing a normal seasonal decrease, whereas the January index showed a gain of 7.6 per cent over January a year ago, according to figures released by Printer's Ink.

Mills in the United States and Canada produced 307,316 tons of newsprint during January, compared with 282,625 tons in the same month in 1935, an increase of 24,691 tons or 8.7 per cent, according to News Print Service Bureau figures. This was the greatest production in any January for mills in both countries since 1930, and compared with the record output for the month of 338,265 tons in 1929. Canadian newsprint production continued to soar to record levels, and the output of 227,955 tons in January this year exceeded the production in that country for any previous January in the history of the Canadian industry, comparing with 201,959 tons in January last year, a gain of 25,996 tons or 13.8 per cent. United States production, on the other hand, continued to lag, decreasing 1,305 tons to 79,361 tons compared with a year ago.

The steady climb in the output of Canadian mills, while that of United States producers has been declining equally as steadily, has increased the proportion of the total output accounted for by the former to the record level of 74.2 per cent. Only 12 years ago, United States mills produced more than half of the total output of newsprint in the two countries, leaving but 48.4 per cent for Canadian producers. In every subsequent year, excepting 1930, the share of the Canadian producers has increased. The last year in which United States mills produced as much as half the newsprint of the two countries was in 1926.

Shipments of newsprint ran behind production during January and stocks at Canadian mills rose to 76,658 tons at the end of that month, and at U. S. mills 14,194 tons, making total stocks of 90,852 tons, contrasted with 40,327 tons a month previously, and 69,209 tons at the end of January, 1935.

Production of paperboard in the United States during 1935 reached a total of 3,294,055 net tons, according to official figures issued by the U. S. Census Bureau, constituting an increase of 454,350 tons or 16.0 per cent over the 2,839,705 tons produced by identical mills in the preceding year, and a gain of 381,321 tons or 13.0 per cent over the 2,912,734 tons produced in 1933. The statistics are compiled from reports of 93 board manufacturers. Mills produced at an average of 67.8 per cent of their rated capacity during 1935, against 59.6 per cent in 1934 and 63.0 per cent in 1933. Production in the month of December last amounted to 243,594 tons, contrasted with 294,290 tons in the month before, and 205,518 tons in December, 1934. New orders received by mills in December called for a total of 234,753 tons of board, against 272,477 tons in the month preceding, while unfilled orders held by mills at the end of December last were for 81,894 tons, against 88,971 tons a month earlier.

◆ ◆

### ◆ Polaroid Gives Science a New Tool

Polaroid, a light-polarizing glass that solves a problem as old as science, was recently introduced to the public and was demonstrated by the inventor, Edwin H. Land, Boston scientist, before a group of scientists and newspaper men at the Waldof-Astoria. Polaroid was shown to remove glare from automobile headlights; make life-like three-dimensional movies available for commercial projection; give beauty specialists and photographers a new penetrating light for viewing the skin; provide engineers with a powerful means of spotting defects in the design of new bridges, aircraft, and other structures long before they are built; and give science a new tool for prying out secrets in many branches of knowledge.

Polaroid looks like clear, colorless glass. Light that has passed through Polaroid looks like ordinary light. The light rays, however, are actually combed out or polarized so that all the vibrations of the rays occur in one plane, so that light can now be controlled on a scale never known before.

Large quantities of Polaroid were used in the demonstration and it was stated that manufacturing facilities have been completed in anticipation of a heavy demand for commercial use.

◆ THE PATTERSON FOUNDRY & MACHINE CO. has announced the appointment of Kenneth S. Valentine, as District Manager at New York. Mr. Valentine will have charge of sales in Metropolitan New York and in New England, and will, in addition, act in an advisory capacity on mixing problems in general.

"NON-USERS ARE THE LOSERS"

TENAX FELTS

# FINISH AND TRIM

## *Your Responsibility Never Ends!*

It isn't only music that goes "round and around". When you make paper, you usually have only a vague idea of when and where it is going to be used . . . SO, make it *RIGHT* from start to finish, in order that it may please and satisfy the broker, the jobber, the pressman, and the ultimate customer . . . let TENAX FELTS help you to make EVERY RUN RIGHT, and EVERY RUN COUNT in the accepted production total.

*"Non-Users Are the Losers"*

LOCKPORT FELT COMPANY

NEWFANE, NEW YORK, U. S. A.

PYRO THE IMPROVED SURFACE PYROMETER

**A SELF-CONTAINED, RUGGED, QUICK-ACTING, ACCURATE and SCIENTIFICALLY DESIGNED PRECISION INSTRUMENT for CURVED or FLAT, STATIONARY or MOVING SURFACES.**

Due to patented clamping-device embodied in indicator —A PYRO FEATURE— contact and reading of actual temperatures no longer have to be made simultaneously.

Extension handles to meet your conditions.

State your requirements and write for special bulletin No. 60, illustrating our various models, including our NEW UNIVERSAL type.

THE PYROMETER INSTRUMENT CO.

104-109 Lafayette St. New York, N. Y.

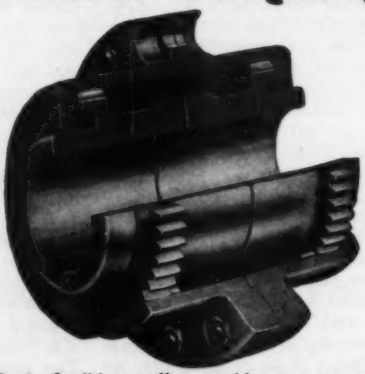
*For coal ash fusion determinations and recovery furnace temperatures, etc., we recommend our:*

PYRO THE SIMPLIFIED OPTICAL PYROMETER

*Ask for special bulletin, describing its advanced and unique features.*

POOLE

Flexible Couplings



The Poole flexible coupling combines great mechanical strength with an unusual capacity for adapting itself to ordinary shaft misalignments. It has no springs—rubber—pins—bushings—die castings or any flexing materials that require frequent replacement.

Using strong specially treated steel forgings, long wearing gears in constant bath of oil, this coupling eliminates your coupling troubles.

*Oil Tight—Dust Proof—Free End Float—Fully Lubricated*

*Send for a copy of our Flexible Coupling Handbook*

**Poole Foundry & Machine Co.**

**Baltimore, Maryland**

# Domestic RAW MATERIALS

## ◆ Papermaking Rags

Recent advancement in prices of roofing rags has been nothing short of sensational, while market values of new cotton cuttings are steadily climbing and all other grades of rags for papermaking exhibit decided strength. Very inclement weather over most of the country during January and February added to the extremely tight supply condition in rag stock, and led to the further sharp increases in prices. Market levels of many classes of rags now are higher than have been known in some years, and there is every indication that the end of the advance has not yet been reached, although more reserved sentiment within trade circles is that as the spring draws on and rag collections and production expand, the probabilities are increased supplies will relieve the pressing shortage and result in some easing in prices.

Roofing rags have shot upward at a rapid pace, stiff advances being recorded in both the eastern and western markets. No. 1 domestic roofing or satinet garments have sold in the East to roofing felt mills at 2.25 cents per pound, and No. 2 domestic roofing at 2 cents f.o.b. dealers' shipping points, with the probabilities that these prices have been exceeded in exceptional cases. Very nearly these same prices have been paid by mills in the Middle West, f.o.b. shipping centers; in fact, it is said that western mills also have in some cases granted slightly higher. Foreign roofing stock has jumped to where sales of dark colored cottons have been reported to mills at 2.25 cents a pound ex dock New York or other American Atlantic ports, while foreign linsey garments are quoted up around a nominal basis of 2.60 cents ex dock. Even Spanish, Egyptian or other low quality dark cottons are said to have brought 1.90 cents, and perhaps more, on an ex dock basis.

Sales of No. 1 new white shirt cuttings have been reported at 8 cents a pound f.o.b. dealers' points, and it is nothing out of the ordinary for sellers now to ask well above this price; in fact, dealers are advancing quotations on cotton cuttings of nearly all grades after every subsequent sale to mills. Fancy shirt cuttings are held at 3 cents or higher, unbleached muslins at 8.50 cents, light silesias at 5.50 cents, blue overall cuttings at 5.75 cents (nominal), washables at 2.75 to 2.85 cents, new white canvas cuttings at 7.50 cents, and bleached canton flannels at 7.25 cents, all f.o.b. shipping points. It is asserted that recent purchasing by paper mills, together with the fairly large shipments of cuttings abroad, have reduced stocks of most grades substantially, and that fresh supplies are coming in slowly, with the result dealers are cautious in booking orders and are not a bit backward in raising their asking prices.

The rise in roofing stock has carried other old cotton rags quotably higher, and No. 1 old repacked whites are generally priced at 3.50 cents or thereabouts, with repacked twos and blues about 2.75 cents, and repacked thirds and blues 2.40 to 2.50 cents f.o.b. dealers' points.

## ◆ Old Paper

Practically all descriptions of old paper have shown additional price increases under a very tight supply condition and a ready demand from consuming mills absorbing just about all the available tonnage in the market. Prices of low grades have moved up to where they are on higher levels in the East than have been known in several years at least. Folded news is selling in the East at 45 cents per hundred pounds and No. 1 mixed paper at 35 cents f.o.b. New York, while old corrugated boxes have advanced to 55 cents at shipping points, heavy book stock to 60 cents, No. 1 old kraft paper to 1.05 to 1.10 cents a pound, white news cuttings to 1.45 cents, No. 1 soft white shavings of ordinary quality to 2.15 cents, and No. 1 hard white envelope cuttings to 2.60 cents. At these prices packers have been careful in entering sales commitments owing to severe weather preventing them from making usual collections. In the Middle West, prices of 47½ cents per hundred pounds on folded newspapers, 37½ cents on mixed paper, and 52½ cents on old corrugated f.o.b. Chicago have prevailed.

## ◆ Rope and Bagging

While some paper mills do not appear eager for old rope supplies and are bidding only in the vicinity of 2.25 cents a pound f.o.b. shipping points for No. 1 domestic old manila rope, others are paying well above this price or fully 2.50 cents for both domestic and foreign rope, and the indications are those mills bidding the lower price are securing little or no old rope. The market tone is firm and dealers put stress on the tight supply position and express the opinion that prices will rise further.

Demand for old bagging has subsided appreciably but the market is so well sold up prices are not stirring from the levels reached during the spurt of active consumer buying some time ago. In fact, any change in market levels recently has been upward, roofing bagging having advanced to where sales to mills have been made at 1.75 cents a pound at shipping points for domestic and ex dock New York for foreign. No. 1 scrap bagging is 2 cents or higher per pound f.o.b. eastern shipping centers, and No. 1 gunny bagging approximately 2.10 cents or more at shipping points and ex dock Atlantic ports.

## ◆ Pulpwood

The quotable position of pulpwood is firm, and supplies are moving steadily against contracts except, of course, in instances where severe weather has held up the movement.

## ◆ Mechanical Pulp

The mechanical wood pulp market is exhibiting greater stability than in a long while, demand is of fairly broad scope, and indications are producers are faring better from a profit standpoint than perhaps in some years. The market level is not high but the prices manufacturers are securing for groundwood are more favorable than in a lengthy period, and, from all indications, afford at least some remuneration to grinders. The basis quoted on Canadian and domestic groundwood is $22.50 per short ton ex dock American Atlantic seaboard, with higher differentials named on other delivery points, and this price is expected to prevail for the first quarter of the current year. On a f.o.b. pulp mill basis, domestic groundwood is reported selling at $23 or $24 to perhaps higher, depending on the haul to consuming plants, though it is acknowledged very little domestic groundwood is being sold in the open market, most grinders needing all the pulp they are producing. Steadiness in imported groundwood lends support to the market, Scandinavian dry being quoted at $23 to slightly higher per short ton ex dock American Atlantic seaboard.

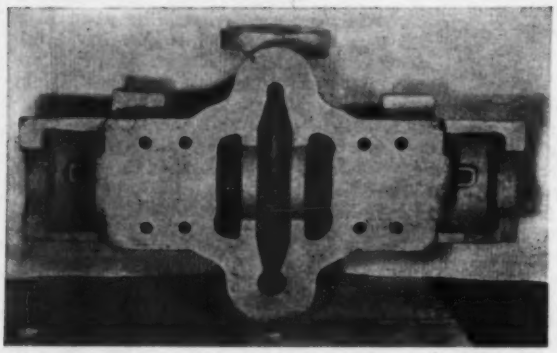
## ◆ Chemical Pulp

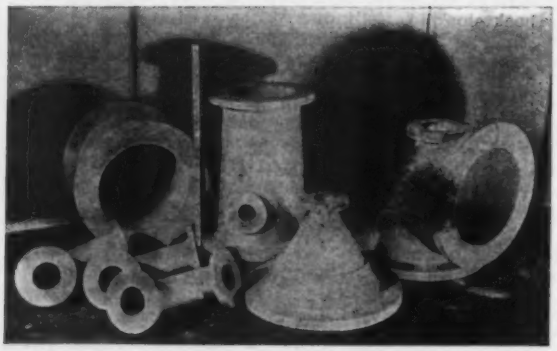
Domestic and Canadian manufacturers of chemical wood pulp, like so many pulp producing mills in Scandinavia and elsewhere in Europe, are so well sold up for such a considerable time ahead that they are not at all eager for additional orders in most instances, and are adopting a rather independent attitude concerning prices. The market tone is firm decidedly. No longer are consumers succeeding in getting anything smacking of a price concession when they buy; instead, they find it necessary to meet full quoted prices, and in frequent cases experience difficulty in procuring the pulp desired for precisely the delivery they may want. Bleached sulphite is 2.50 cents per pound ex dock American Atlantic seaboard with higher qualities ranging up to 2.75 cents, and higher. Unbleached sulphite is 1.90 to 2.05 cents a pound ex dock, depending on grade, while domestic bleached soda pulp is 2.50 cents delivered paper mills, and domestic or Canadian kraft pulp of No. 1 northern grade about 2.15 to 2.25 cents delivered consuming mills.

## ◆ Chemicals

Papermaking chemicals exhibit price firmness, and are reported moving freely in comparatively large volume into consuming channels. Casein is quoted at 15 to 15.50 cents per pound for domestic and 14 to 14.50 cents for the imported product, according to the grind. Caustic soda is selling at 2.55 cents a pound for the solid product f.o.b. works, and soda ash holds to a price basis of 1.20 cents a pound at works.

# *Alloy Steel Castings*





## *Made to Meet the Acid Test of* HOT SULPHITE LIQUORS

**Yes, and it's a real "acid test" in all that the expression implies. That's why Durco Alloy Steel Castings are preferred by those who have compared, checked and analyzed to reach their own independent conclusions.**

**For pulp mills, there are Pumps, Valves, Digester Fittings, Panzl Strainers, Pipe Fittings, etc., of our own design, as well as special castings which we make to your blueprints.**

**If corrosion is causing you worry and costing you money at any point, Durco Alloy Steels now make it possible to eliminate the trouble. Make use of our specialized facilities . . . your investigation is invited.**

**ALLOY STEEL DIVISION**
**of The Duriron Co., Inc.**
**444 N. Findlay St. Dayton, Ohio**

**DURCO**
**KA2SMo**
**CARBON 0.07% MAXIMUM**

# Be strong and very courageous

*A message from KVP, makers of Food Protection Papers and a good grade of Bond and Writing Papers for office and school use.*

1936 - what?

Will Fear and Worry get you down? Don't let them, they are Killers! Wars and rumors of wars are their deadly weapons, political and economic uncertainties their fatal poisons.

You are greater than anything that can happen to you. Faith and Courage will conquer all difficulties.

Go forward, and be strong and very courageous!

KALAMAZOO VEGETABLE PARCHMENT CO.
PARCHMENT KALAMAZOO COUNTY MICHIGAN

# Import and Export MARKETS

## IMPORTS

### ◆ Wood Pulp

A new high volume record was reached by wood pulp imports into the United States during the calendar year 1935. The aggregate value of last year's importations was well under some other previous years, but a larger tonnage of wood pulp was brought into this country during 1935 than in any former twelve-month.

According to figures compiled from official U. S. Department of Commerce reports, imports of chemical and mechanical pulp of all grades into the United States in 1935 totaled 1,933,643 short tons of 2,000 pounds, air dry weight, valued at $70,760,951, comparing with 1,806,128 short tons of all classes of wood pulp of a total declared value of $61,850,269 during 1934. This was an increase last year over the preceding year of 127,515 tons, or 7.05 per cent, and a gain of $8,910,682, or 14.4 per cent, in value. The 1935 total imports of wood pulp also showed a rise over the 1,733,744 long tons of both mechanical and chemical pulp, valued at $57,398,920, imported in 1933, and previous to 1935 standing as the high record of wood pulp imports into the United States in a single year.

Chemical pulp imports during 1935 amounted to 1,743,603 short tons, valued at $67,483,566, showing an increase of 126,848 tons, or 7.8 per cent, in quantity over the 1,616,754 short tons of a declared value of $58,605,219 imported in 1934.

Imports of mechanical pulp or groundwood last year were but slightly above the 1934 receipts of such pulp, totaling 190,041 short tons, valued at $3,277,385, against 189,374 short tons of a value of $3,245,050 in the preceding year. Bleached sulphite imports into the United States last year amounted to 429,424 short tons of a declared value of $21,934,154, contrasted with 398,142 short tons of a value of $19,415,304 in 1934, while unbleached sulphite imports last year were 693,026 short tons of a value of $24,026,390, against 675,491 tons of a value of $21,791,584 in the year before. Imports of unbleached sulphate or kraft pulp reached 526,684 short tons of a value of $15,893,593, against 481,435 tons of a value of $13,733,776 in 1934, while bleached sulphate receipts were 84,658 short tons of a value of $5,193,789, against 54,068 tons of a value of $3,334,713 in 1934.

The average value of the bleached sulphite imported last year was $51.07 per short ton, compared with $48.76 in 1934; of unbleached sulphite, $34.66 a short ton, against $32.26 in 1934; of unbleached kraft pulp, $30.17 per short ton, against $28.31, and of groundwood, $17.24 per short ton, against $17.13 in 1934.

The market situation in imported wood pulp remains exceedingly firm. Pulp mills in Scandinavia and elsewhere abroad, and more particularly kraft pulp plants, are well sold for the current year; it is stated that quite a few definitely have no more tonnage to dispose of for shipment during the rest of 1936, and some are fairly well contracted into 1937. Kraft sellers are exerting the upper hand; without any question their market is a sellers' market, and board and paper mill consumers are eagerly inquiring around seeking to cover forward requirements they apparently would rather have provided for than not. The tone in sulphite, both bleached and unbleached, also is firm and tending to stiffen, although there is not the degree of strength nor as bullish a supply condition as marks kraft pulp.

Any prime kraft pulp available for prompt or early delivery is quoted firmly at 2 cents a pound, ex dock American Atlantic seaboard, or very close to this price, with sales having been made at 2 cents. Far off shipments from abroad are 1.85 to 1.90 cents landed here, with the bare possibility that some producing mills in Europe might accept 1.80 cents. Prime bleached sulphite is 2.50 cents a pound upwards ex dock Atlantic seaboard, and prime strong unbleached sulphite 1.90 to 2.05 cents, depending on grade. It is reported that sellers are not by any means pressing offerings of sulphite, and that price concessions have absolutely and entirely disappeared. Scandinavian groundwood is quoted at $23 to $23.50 per short ton for shipment from abroad, on the dock at American Atlantic ports, with moist pulp slightly under this price level.

### ◆ Paper

Imports of newsprint paper into the United States, which represent between 85 and 90 per cent of our total importations of paper and paper products, reached a total of 2,383,316 tons during 1935, valued at $82,265,267, an increase in both quantity and value of 8 per cent over the 1934 imports. Other classes of paper and board imported last year reached a value of $11,178,649, a rise of 9 per cent over 1934. This increase was largely due to the heavy increases which took place in imports of other printing papers and boards and to a three-fold increase in imports of kraft wrapping paper. Imports of other classes of wrapping papers and of writing papers declined substantially, while those of cigarette papers, which rank second to newsprint in the value of imports, decreased 4 per cent. Total imports of all paper and paper products reached an aggregate value last year of $93,443,916, contrasted with $86,518,680 in 1934.

### ◆ Paper Stock

A substantial rise in imports of rags for papermaking into the United States occurred last year, U. S. Department of Commerce figures placing total receipts at 201,310,993 pounds of a declared value of $2,411,424, or just about double the quantity and value of the 1934 imports, which amounted to 101,523,797 pounds of a value of $1,282,668. Imports of miscellaneous paper stock, comprising old rope, bagging, waste paper, etc., were also higher last year, in both volume and value, totaling 77,800,892 pounds of a declared value of $1,110,652, contrasted with 52,524,939 pounds of a value of $753,617 in 1934.

## EXPORTS

Exports of paper and paper products from the United States during the calendar year 1935 reached a total valuation of $20,519,550, according to official U. S. Department of Commerce figures, representing an increase of $1,644,105, or 8.7 per cent, over similar exports during 1934. This result was not unexpected in view of the fact that paper exports during 1935 up to the month of August were uniformly higher in value than during the corresponding months in 1934. During August there was a decline of 5 per cent in aggregate value, followed in September by a further drop of 9 per cent, thus bringing exports for the third quarter down to a level of the corresponding 1934 period.

Most classes of paper and board contributed to the export gain last year. Notable exceptions were newsprint, wrapping papers, and overissue newspapers. Exports of newsprint were 4 per cent in volume under those of the preceding year, while shipments of wrapping and overissue news declined between 10 and 15 per cent. Writing papers, uncoated book paper, and board, as well as sheathing and building papers and insulating and wall boards, contributed to the larger export shipments during 1935.

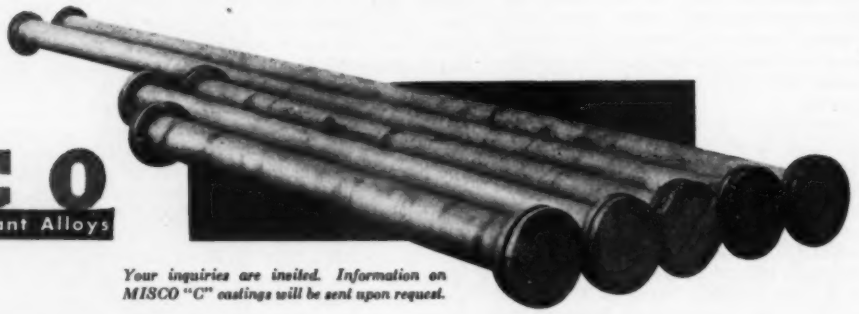
Exports of paper base stocks scored an appreciable gain also in 1935, reaching a total value of $9,890,499, against $8,149,686 in 1934. Sulphite wood pulp shipments rose to 148,586 tons, an increase of 20 per cent over 1934. In addition, 4,727 tons of other classes of wood pulp were exported, while exports of rags and other wastes for papermaking totaled 30,543 tons of a value of $1,075,721.

# *Twenty-Nine*

## LEADING SULPHITE PRODUCERS

## *are using* MISCO "C" *castings*

**THE CORROSION RESISTANT ALLOY**



**MISCO**

Heat and Corrosion Resistant Alloys

*Your inquiries are invited. Information on MISCO "C" castings will be sent upon request.*

**MICHIGAN STEEL CASTING COMPANY**

*One of the World's Pioneer Producers of Chromium-Nickel Alloys*

**1992 GUOIN STREET, DETROIT, MICHIGAN**

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# CAMACHINE 19

High Speed
Winder
for Book Kraft
Newsprint and
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Standard Widths
100" to 200"
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Operating Speed
up to 2 800 F P M.

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Link-Belt Company
Norma-Hoffmann Bearings Corp.

**Bearings (Thrust)**
Bantam Ball Bearing Co.
Improved Paper Mach'y Corp.
Norma-Hoffmann Bearings Corp.

**Beater Valves**
Midwest-Fulton Mach. Co.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

**Beaters**
E. D. Jones & Sons Co.
Midwest-Fulton Mach. Co.
Paper & Ind. App., Inc.
Valley Iron Works Co.

**Beaters (Continuous)**
Improved Paper Mach'y Corp.

**Beating, Washing and Bleaching Engines**
Downingtown Mfg. Co.
Holyoke Machine Co.
E. D. Jones & Sons Co.
Midwest-Fulton Mach. Co.
Valley Iron Works Co.

**Bed Plates**
Downingtown Mfg. Co.
Midwest-Fulton Mach. Co.
Simonds Worden White Co.

**Belt Drives**
Dodge Mfg. Corp.
Link-Belt Company

**Belt Fasteners**
Flexible Steel Lacing Co.

**Belt Lacing**
Flexible Steel Lacing Co.

**Belting (Leather)**
J. E. Rhoads & Sons

**Belting (Rubber)**
Dayton Rubber Mfg. Co.

**Belting (Silent Chain)**
Link-Belt Company
Morse Chain Company

**Belts (V)**
Allis-Chalmers Mfg. Co.
Dayton Rubber Mfg. Co.
Gates Rubber Co.

**Bleach Ejectors**
B. F. Perkins & Son, Inc.

**Bleaching Systems**
Moore & White Co.

**Blowers**
General Electric Co.
Improved Paper Mach'y Corp.
J. O. Ross Eng. Corp.
J. T. Ryerson & Son, Inc.

**Blow Pipes**
D. J. Murray Mfg. Co.

**Blow Pits**
Hauser-Stander Tank Co.
Valley Iron Works Co.

**Blow Valves**
Carthage Machine Co.
Eastwood-Nealley Corp.
D. J. Murray Mfg. Co.

**Board Machines**
Beloit Iron Works
Downingtown Mfg. Co.
Oliver United Filters Inc.
Smith & Winchester Co.

**Boiler Tubes & Fittings**
J. T. Ryerson & Son, Inc.

**Boilers**
Springfield Boiler Co.

**Brass Wire Cloth**
Lindsay Wire Weaving Co.

**Buckets (Elevator)**
Link-Belt Company

**Bulkers**
B. F. Perkins & Son, Inc.

**Bundling Presses**
Paper Conv. Mach. Co.

**Calender Cooling**
J. O. Ross Eng. Corp.

**Calender Doctors**
Beloit Iron Works
Downingtown Mfg. Co.
Smith & Winchester Co.

**Calender Rolls**
Holyoke Machine Co.
B. F. Perkins & Son, Inc.
Textile-Finish. Mach. Co.

**Calenders**
Beloit Iron Works
Downingtown Mfg. Co.
Holyoke Machine Co.
B. F. Perkins & Son, Inc.
Textile-Finish. Mach. Co.
Smith & Winchester Co.

**Caselu**
Paper Makers Chem. Corp.

**Castings (Brass or Bronze)**
Downingtown Mfg. Co.
Duriron Co.
Eastwood-Nealley Corp.
Smith & Winchester Co.
Valley Iron Works Co.

**Castings (Corrosion Resist.)**
Carthage Machine Co.
Duriron Co.
Eastwood-Nealley Corp.
International Nickel Co.
Michigan Steel Cast. Co.
J. T. Ryerson & Son, Inc.

**Castings (Grey Iron)**
Beloit Iron Works
Downingtown Mfg. Co.
Link-Belt Company
Smith & Winchester Co.
Valley Iron Works Co.

**Castings (Nickel Alloy)**
International Nickel Co.

**Castings (Steel & Semi-Steel)**
Link-Belt Company
Springfield Boiler Co.
Valley Iron Works Co.

**Castings (Sulphite Mill)**
Carthage Machine Co.
Duriron Co.
Eastwood-Nealley Corp.
Michigan Steel Cast. Co.

**Caustic Soda**
Columbia Alkali Corp.
Grasselli Chemical Co.

**Chain Drives**
Link-Belt Company
Morse Chain Company

**Chains**
Link-Belt Company
J. T. Ryerson & Son, Inc.

**Chemicals**
Columbia Alkali Corp.
General Chemical Co.
Grasselli Chemical Co.
Titanium Pigment Co.
R. T. Vanderbilt Co., Inc.

**Chilled Iron Rolls**
Improved Paper Mach'y Corp.
B. F. Perkins & Son, Inc.

**Chip Crushers**
Carthage Machine Co.
D. J. Murray Mfg. Co.

**Chippers**
Carthage Machine Co.
Holyoke Machine Co.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

**Chromium Plating**
Chrome Plating Co., Inc.
Chromium Corp. of Amer.

**Clutches**
Beloit Iron Works
Dodge Mfg. Corp.
Holyoke Machine Co.
Rodney Hunt Mach. Co.
Link-Belt Company
Moore & White Co.
D. J. Murray Mfg. Co.

**Coal & Ash Hand. Systems**
Link-Belt Company

**Cogs (Wood)**
N. P. Bowsher Co.

**Concrete Reinforcing Steel**
J. T. Ryerson & Son, Inc.

**Consistency Regulators**
DeZurik Shower Co.
Trimbey Machine Works
Valley Iron Works Co.

**Consulting Engineers**
See Engineers

**Controllers (Temperature)**
Taylor Instrument Cos.

**Conveyors**
Allis-Chalmers Mfg. Co.
Link-Belt Company

**Conveyors (Belt)**
Link-Belt Company

**Conveyors (Trim)**
J. O. Ross Eng. Corp.

**Cooking Systems, (Chem. Pulp)**
Chemipulp Process, Inc.

**Cores (Collapsible)**
Smith & Winchester Co.

**Corrugated Sheet Metal**
J. T. Ryerson & Son, Inc.

**Cotton Rolls**
B. F. Perkins & Son, Inc.
Textile-Finish. Mach. Co.

**Coupling**
Bartlett Hayward Co.
Beloit Iron Works
Dodge Mfg. Corp.
E. D. Jones & Sons Co.
Link-Belt Company
Midwest-Fulton Mach. Co.
Morse Chain Company
Poole Foundry & Machine Co.

**Cranes (Crawling Tractor)**
Link-Belt Company

**Cranes, Electric (Traveling)**
Cleveland Tramrail

**Cranes (Locomotive)**
Link-Belt Company

**Cranes, Monorail**
Cleveland Tramrail

**Crepe Machines**
Downingtown Mfg. Co.

**Crushers (Coal & Coke)**
Link-Belt Company

**Cutters**
Beloit Iron Works
Cameron Machine Co.
Downingtown Mfg. Co.
Holyoke Machine Co.
Samuel M. Langston Co.
Smith & Winchester Co.

**Cylinder Machines**
Beloit Iron Works
Downingtown Mfg. Co.
Pusey & Jones Corp.
Smith & Winchester Co.
Valley Iron Works Co.

**Cylinder Molds (New or Repaired)**
Beloit Iron Works
Carthage Machine Co.
Downingtown Mfg. Co.
Eastwood-Nealley Corp.
Improved Paper Mach'y Corp.
Lindsay Wire Weaving Co.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

**Cylinder Wires**
Appleton Wire Works
International Nickel Co.

**Dampeners**
B. F. Perkins & Son, Inc.

**Damper Regulators**
Brown Instrument Co.

**Dandy Rolls**
Appleton Wire Works
Downingtown Mfg. Co.
Eastwood-Nealley Corp.
Lindsay Wire Weaving Co.

**Deckle Cutters**
DeZurik Shower Co.

**Die Presses**
Smith & Winchester Co.

**Digester Fittings**
Carthage Machine Co.
D. J. Murray Mfg. Co.

**Digester Linings**
Stebbins Engr. & Mfg. Co.

**Digester Valves**
Carthage Machine Co.
D. J. Murray Mfg. Co.

**Doctor Blades**
Improved Paper Mach'y Corp.
International Nickel Co.

**Drainage Systems (Dryer)**
Midwest-Fulton Mach. Co.
Stickle Steam Spec. Co.

**Dryer Joints**
Beloit Iron Works
Carthage Machine Co.

**Dryer Temperature Control**
Brown Instrument Co.
Midwest-Fulton Mach. Co.
Stickle Steam Spec. Co.

**Dryers**
See Paper Machines

**Drying Machines**
J. O. Ross Eng. Corp.

**Drying Systems**
J. O. Ross Eng. Corp.

**Dusters**
Carthage Machine Co.
Holyoke Machine Co.
E. D. Jones & Sons Co.
Moore & White Co.

**Economizers**
J. O. Ross Eng. Corp.
Stickle Steam Spec. Co.

**Electrical Appliances**
Ideal Commutator Dresser Co.

**Elevators**
Link-Belt Company

**Embossing Machines**
B. F. Perkins & Son, Inc.
Textile-Finish. Mach. Co.

**Engineers**
Chemipulp Process, Inc.
Ferguson Engineers
Hardy S. Ferguson
George F. Hardy
Stebbins Engr. & Mfg. Co.

**Engineers (Drying)**
J. O. Ross Eng. Corp.

**Engineers (Heating and Ventilating)**
J. O. Ross Eng. Corp.

**Evaporators (Disc)**
D. J. Murray Mfg. Co.

**Exhausters**
International Engr., Inc.
J. O. Ross Eng. Corp.

**Fans (Ventilating)**
International Engr., Inc.
B. F. Perkins & Son, Inc.
J. O. Ross Eng. Corp.

**Feed Water Heaters**
Cochrane Corporation

**Felt Drying System**
J. O. Ross Eng. Corp.

**Felt Rolls**
See Paper Machines

**Felt Washers**
Rodney Hunt Mach. Co.

**Felt & Wire Guides**
Moore & White Co.

**Felts (Jacket)**
Appleton Woolen Mills
Bulkley, Dunton & Co.
Draper Brothers Co.
F. C. Huyck & Sons
Lockport Felt Co.
Orr Felt & Blanket Co.
Shuler & Benninghofen
Waterbury Felt Co.

**Felts (Woolen)**
Appleton Woolen Mills
Bulkley, Dunton & Co.
Draper Brothers Co.
F. C. Huyck & Sons
Lockport Felt Co.
Orr Felt & Blanket Co.
Shuler & Benninghofen
Waterbury Felt Co.

**Fillers (Paper)**
English China Clay Sales Corporation
Titanium Pigment Co.
R. T. Vanderbilt Co., Inc.

**Filters**
Cochrane Corporation
Improved Paper Mach'y Corp.
Oliver United Filters Inc.

**Floor Plates (Safety)**
J. T. Ryerson & Son, Inc.

**Flow Meters**
Brown Instrument Co.
Cochrane Corporation

**Foam Killers**
Paper Makers Chem. Corp.

**Forming Machines**
Downingtown Mfg. Co.

**Fourdrinier Machines**
Beloit Iron Works
Downingtown Mfg. Co.
Moore & White Co.
Pusey & Jones Corp.
Smith & Winchester Co.

**Fourdrinier Wires**
Appleton Wire Works
Eastwood-Nealley Corp.
Lindsay Wire Weaving Co.

**Friction Calenders**
Holyoke Machine Co.
B. F. Perkins & Son, Inc.
Textile-Finish. Mach. Co.

**Galvanized Sheets (Iron & Steel)**
J. T. Ryerson & Son, Inc.

**Gas Analyzers**
Brown Instrument Co.

**Gate Hoists**
Rodney Hunt Mach. Co.
D. J. Murray Mfg. Co.

**Gates (Hydraulic)**
Rodney Hunt Mach. Co.

**Gauges (Pressure)**
Brown Instrument Co.
Taylor Instrument Cos.

**Gauges (Thickness)**
E. J. Cady & Co.

**Gauges (Vacuum)**
Taylor Instrument Cos.

**Gears**
Dodge Mfg. Co.
General Electric Co.
Holyoke Machine Co.
Improved Paper Mach'y Corp.
E. D. Jones & Sons Co.
Link-Belt Company
Poole Fdry. & Mch. Co.
Valley Iron Works Co.

**Gears (Herringbone)**
Link-Belt Company
Poole Fdry. & Mch. Co.

**Gears (Silent Chain)**
Link-Belt Company

**Gears (Worm)**
Beloit Iron Works
Link-Belt Company
Poole Fdry. & Mch. Co.

**Generating Sets**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Generators (Steam)**
General Electric Co.

**Generators (Turbo)**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Governors (Turbine)**
Rodney Hunt Mach. Co.

**Granite Rolls**
Beloit Iron Works
Improved Paper Mach'y Corp.
B. F. Perkins & Son, Inc.

**Grease**
Socony-Vacuum Oil Co.
Standard Oil Co. (Ind.)
The Texas Company

**Grease Cups**
Link-Belt Company

**Grinders (Pulp)**
Carthage Machine Co.
Holyoke Machine Co.

**Grinding Wheels**
Norton Co.
Simonds Worden White Co.

**Hangers**
Dodge Mfg. Co.
Holyoke Machine Co.
Link-Belt Company

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PACIFIC SALES COMPANY, Security Bldg., Portland, Ore.

**Heaters (Unit)**
D. J. Murray Mfg. Co.
J. O. Ross Eng. Corp.

**Heating Systems**
J. O. Ross Eng. Corp.

**Hoists (Chain)**
J. T. Ryerson & Son, Inc.

**Hoists (Electric)**
Cleveland Tramrail
General Electric Co.
J. T. Ryerson & Son, Inc.

**Hoists (Monorail)**
Cleveland Tramrail

**Hoists (Portable, Air and Steam)**
Allis-Chalmers Mfg. Co.

**Hoods (Paper Machine)**
J. O. Ross Eng. Corp.

**Hydrators**
Love Brothers, Inc.
D. J. Murray Mfg. Co.

**Hydrogen—ion Apparatus**
LaMotte Chem. Prod. Co.

**Hydrometers**
Taylor Instrument Cos.

**Hygrometers**
Brown Instrument Co.
Cambridge Instrument Co.
Taylor Instrument Cos.

**Indicators (Super Heat)**
Taylor Instrument Cos.

**Industrial Cleaners**
Paper Makers Chem. Corp.

**Inlets (High Pressure)**
Valley Iron Works Co.

**Iron & Steel Supplies**
J. T. Ryerson & Son, Inc.

**Joints (Dryer)**
Beloit Iron Works
Carthage Machine Co.

**Jordan Engines**
E. D. Jones & Sons Co.
Smith & Winchester Co.
Valley Iron Works Co.

**Kneaders**
E. D. Jones & Sons Co.

**Knives (Machine)**
Simonds Worden White Co.

**Knot Borers**
DeZurik Shower Co.

**Knot Saws**
DeZurik Shower Co.
D. J. Murray Mfg. Co.

**Knotters**
Improved Paper Mach'y Corp.
Moore & White Co.
Trimbey Machine Works

**Laboratory Apparatus**
Valley Iron Works Co.

**Latex**
United States Rubber Products, Inc.

**Layboys**
Moore & White Co.

**Lubricants**
Socony-Vacuum Oil Co.
Standard Oil Co. (Ind.)
The Texas Company

**Machine Shop Equipment**
J. T. Ryerson & Son, Inc.

**Materials Handling Systems**
Cleveland Tramrail
Link-Belt Company

**Metering Systems**
Trimbey Machine Works

**Meters**
Taylor Instrument Cos.

**Meters (Flow)**
Brown Instrument Co.

**Micrometers**
E. J. Cady & Co.

**Mill Cogs**
N. P. Bowsher Co.

**Monorail Systems**
Cleveland Tramrail

**Motor Generator Sets**
Allis-Chalmers Mfg. Co.
Reliance Elec. & Engr. Co.

**Motors**
Allis-Chalmers Mfg. Co.
General Electric Co.
Reliance Elec. & Engr. Co.

**Napkin Folders**
Paper Conv. Mach. Co.

**Oil**
Socony-Vacuum Oil Co.
Standard Oil Co. (Ind.)
The Texas Company

**Paper Bag Machinery**
Smith & Winchester Co.

**Paper Calender Rolls**
Holyoke Machine Co.
B. F. Perkins & Son, Inc.
Textile-Finish. Mach. Co.

**Paper Cutters & Slitters**
Beloit Iron Works
Cameron Machine Co.
Downingtown Mfg. Co.
Samuel M. Langston Co.
Moore & White Co.
Smith & Winchester Co.

**Paper Dampeners**
B. F. Perkins & Son, Inc.

**Paper Machine Drives**
Beloit Iron Works
Dodge Mfg. Corp.
Downingtown Mfg. Co.
General Electric Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Smith & Winchester Co.

**Paper Machines**
Beloit Iron Works
Downingtown Mfg. Co.
Pusey & Jones Corp.
Smith & Winchester Co.

**Paper Manufacturers**
Hammermill Paper Co.
Kalamazoo Vegetable Parchment Co.

**Paper Testing Instruments**
E. J. Cady & Co.
Arthur B. Green
B. F. Perkins & Son, Inc.

**Penstocks**
Rodney Hunt Mach. Co.

**Perforated Metal**
Harrington & King Perforating Co.

**pH Equipment**
LaMotte Chem. Prod. Co.

**Pillow Blocks**
Beloit Iron Works
Dodge Mfg. Corp.
Link-Belt Co.

**Pipe**
Duriron Co.
Pittsburgh Piping & Equipment Company
J. T. Ryerson & Son, Inc.

**Pipe Equipment**
Taylor Forge & Pipe Wks.

**Pipe (Riveted Steel)**
Taylor Forge & Pipe Wks.

**Pipe (Spiral)**
Taylor Forge & Pipe Wks.

**Pipe Systems Installed**
Pittsburgh Piping & Equipment Company

**Pipe & Tubes (Stainless)**
J. T. Ryerson & Son, Inc.

**Platers**
Holyoke Machine Co.
B. F. Perkins & Son, Inc.

**Plates (Iron & Steel)**
J. T. Ryerson & Son, Inc.

**Plating (Chromium)**
Chrome Plating Co., Inc.
Chromium Corp. of Amer.

**Power Transmission**
Allis-Chalmers Mfg. Co.
Dodge Mfg. Corp.
Link-Belt Company
J. E. Rhoads & Sons

**Press Rolls (Granite)**
Beloit Iron Works
Downingtown Mfg. Co.
B. F. Perkins & Son, Inc.

**Pressure Joints (Rotary)**
Beloit Iron Works

**Pulleys**
Carthage Machine Co.
Dodge Mfg. Co.
Holyoke Machine Co.
Improved Paper Mach'y Corp.
E. D. Jones & Sons Co.
Link-Belt Company
D. J. Murray Mfg. Co.
Valley Iron Works Co.

**Pulp (Chemical)**
Weyerhaeuser Timber Co.

**Pulp Process (Chem.)**
Chemipulp Process, Inc.

**Pulp Screens**
D. J. Murray Mfg. Co.

**Pulp Stones**
Norton Co.

**Pulp Thickeners**
Carthage Machine Co.
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
Moore & White Co.
D. J. Murray Mfg. Co.
Oliver United Filters Inc.
Valley Iron Works Co.

**Pulpwood Stackers**
Link-Belt Company

**Pumps (Acid)**
Duriron Co., Inc.
Oliver United Filters Inc.

**Pumps (Boiler Feed)**
Buffalo Pumps, Inc.
Gould's Pumps, Inc.

**Pumps (Centrifugal)**
Allis-Chalmers Mfg. Co.
Buffalo Pumps, Inc.
Carthage Machine Co.
Downingtown Mfg. Co.
Duriron Co.
Gould's Pumps, Inc.
Oliver United Filters Inc.
Smith & Winchester Co.
Valley Iron Works Co.
Warren Steam Pump Co.

**Pumps (Stock)**
Allis-Chalmers Mfg. Co.
Beloit Iron Works
Buffalo Pumps, Inc.
Carthage Machine Co.
Downingtown Mfg. Co.
Gould's Pumps, Inc.
Moore & White Co.
Smith & Winchester Co.
Valley Iron Works Co.
Warren Steam Pump Co.

**Pumps (Vacuum)**
Oliver United Filters Inc.

**Pyrometers**
Brown Instrument Co.
Cambridge Instrument Co.
Pyrometer Instrument Co.
Taylor Instrument Cos.

**Rag Cutters**
Holyoke Machine Co.
B. F. Perkins & Son, Inc.

**Recording Instruments**
Brown Instrument Co.
Cambridge Instrument Co.
Taylor Instrument Cos.

**Recovery Systems (Chemical Pulp)**
Chemipulp Process, Inc.
D. J. Murray Mfg. Co.
J. O. Ross Eng. Corp.

**Reels**
Beloit Iron Works
Downingtown Mfg. Co.
Moore & White Co.
Smith & Winchester Co.

**Reels (Automatic Collapsing)**
Downingtown Mfg. Co.

**Refiners**
E. D. Jones & Sons Co.
Love Brothers, Inc.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

**Regulators (Pressure and Temperature)**
Taylor Instrument Cos.

**Regulators (Steam)**
Midwest-Fulton Mach. Co.

**Rewinders**
Beloit Iron Works
Cameron Machine Co.
Downingtown Mfg. Co.
Samuel M. Langston Co.
Moore & White Co.
Smith & Winchester Co.

**Roll Heading Machines**
D. J. Murray Mfg. Co.

**Roll Stands**
Cameron Machine Co.

**Roller Bearing Units**
Dodge Mfg. Corp.
Link-Belt Company

**Rolls**
Beloit Iron Works
Carthage Machine Co.
Downingtown Mfg. Co.
Holyoke Machine Co.
Rodney Hunt Mach. Co.
Improved Paper Mach'y Corp.
B. F. Perkins & Son, Inc.
Textile-Finish. Mach. Co.
Valley Iron Works Co.

**Rolls (Embossing)**
B. F. Perkins & Son, Inc.
Textile-Finish. Mach. Co.

**Rolls (Rubber Covered)**
Beloit Iron Works
Downingtown Mfg. Co.
Rodney Hunt Mach. Co.
Valley Iron Works Co.

**Roof Drying Systems**
J. O. Ross Eng. Corp.

**Roofing & Siding (Iron & Steel)**
J. T. Ryerson & Son, Inc.

**Rosin Size**
Paper Makers Chem. Corp.

**Rotary Incinerators**
D. J. Murray Mfg. Co.

**Rotary Pressure Joints**
Beloit Iron Works

**Rotary Printing Units**
Paper Conv. Mach. Co.

**Safety Treads**
J. T. Ryerson & Son, Inc.

**Salt Cake**
General Chemical Co.
Grasselli Chemical Co.

**Save-Alls**
Carthage Machine Co.
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
Moore & White Co.
Oliver United Filters Inc.
Paper & Ind. App., Inc.

**Saws**
Valley Iron Works Co.

**Scales (Basis Weight)**
E. J. Cady & Co.

**Screens (Centrifugal)**
Improved Paper Mach'y Corp.

**Screens (Chip)**
Carthage Machine Co.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

**Screens (Diaphragm)**
D. J. Murray Mfg. Co.

**Screens (Flat)**
Beloit Iron Works
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

**Screens (Rotary)**
E. D. Jones & Sons Co.
Moore & White Co.
Trimbey Machine Works
Valley Iron Works Co.

**Separators (Chip)**
Carthage Machine Co.

**Shafting**
Allis-Chalmers Mfg. Co.
Link-Belt Company
Midwest-Fulton Mach. Co.
J. T. Ryerson & Son, Inc.

**Shafts (Collapsible)**
Cameron Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.

**Sheet Metal Work**
J. O. Ross Eng. Corp.

**Sheets (Iron & Steel)**
J. T. Ryerson & Son, Inc.

**Sheets (Stainless Steel)**
J. T. Ryerson & Son, Inc.

**Shower Pipes**
Beloit Iron Works
DeZurik Shower Co.
Downingtown Mfg. Co.
Moore & White Co.
Smith & Winchester Co.

**Shredders**
Carthage Machine Co.
E. D. Jones & Sons Co.
Valley Iron Works Co.

**Silent Chain Drives**
Link-Belt Company
Morse Chain Company

**Silicate of Soda**
General Chemical Co.
Grasselli Chemical Co.

**Slashers**
D. J. Murray Mfg. Co.

**Slitting & Rewinding Mach.**
Beloit Iron Works
Cameron Machine Co.
Downingtown Mfg. Co.
Samuel M. Langston Co.
Moore & White Co.
Smith & Winchester Co.

**Sluice Gates**
D. J. Murray Mfg. Co.

**Soda Ash**
Columbia Alkali Corp.
Grasselli Chemical Co.
Paper Makers Chem. Corp.

**Special Machinery**
Beloit Iron Works
Downingtown Mfg. Co.
Rodney Hunt Mach. Co.
Improved Paper Mach'y Corp.
E. D. Jones & Sons Co.

**Speed Changers**
Rodney Hunt Mach. Co.
Lewellen Mfg. Co.

**Speed Reduction Units**
Rodney Hunt Mach. Co.
Link-Belt Company
Midwest-Fulton Mach. Co.
Morse Chain Company
Poole Foundry & Machine Co.

**Splitters (Wood)**
Carthage Machine Co.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

**Sprockets**
Improved Paper Mach'y Corp.
Link-Belt Company
Morse Chain Company

**Stainless Steel Sheets**
J. T. Ryerson & Son, Inc.

**Steam Joints**
Beloit Iron Works

**Steam Purifiers**
Cochrane Corporation

**Steam Traps**
Midwest-Fulton Mach. Co.
Stickle Steam Spec. Co.

**Steel (Bars, Shapes, Plates, Sheets, Etc.)**
Joseph T. Ryerson & Son

**Stock Cutters**
B. F. Perkins & Son, Inc.

**Stokers**
American Engr. Co.
Link-Belt Company

**Strainers**
Carthage Machine Co.

**Stuff Chests**
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
E. D. Jones & Sons Co.
Midwest-Fulton Mach. Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

**Suction Boxes**
Beloit Iron Works
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
Pusey & Jones Corp.

**Suction Felt Rolls**
Beloit Iron Works
Downingtown Mfg. Co.

**Suction Rolls**
Beloit Iron Works
Downingtown Mfg. Co.

**Sulphite (Bleached)**
Weyerhaeuser Timber Co.

**Sulphur Burners**
Carthage Machine Co.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

**Sulphuric Acid**
General Chemical Co.
Grasselli Chemical Co.

**Supercalenders**
Holyoke Machine Co.
B. F. Perkins & Son, Inc.
Textile-Finish. Mach. Co.

**Tachometers & Tachographs**
Brown Instrument Co.

**Tanks and Vats (Wood)**
Hauser-Stander Tank Co.
Rodney Hunt Mach. Co.

**Tensile Strength & Stretch Testers**
B. F. Perkins & Son, Inc.

**Testers (Bursting Strength)**
E. J. Cady & Co.
B. F. Perkins & Son, Inc.

**Testers (Freeness)**
Arthur B. Green

**Thermometers**
Taylor Instrument Cos.

**Thermometers (Industrial)**
Ideal Commutator Dresser Co.

**Thickness Control**
Lewellen Mfg. Co.

**Thickness Recorders (Paper)**
Brown Instrument Co.

**Thrashers (Rag)**
Holyoke Machine Co.
Pusey & Jones Corp.

**Tramrail Systems**
Cleveland Tramrail

**Transmission (Variable Speed)**
Lewellen Mfg. Co.
Link-Belt Company
Moore & White Co.

**Tubes (Nickel Alloy)**
International Nickel Co.

**Turbines (Steam)**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Turbines (Water)**
Holyoke Machine Co.
Rodney Hunt Mach. Co.

**Turpentine**
Paper Makers Chem. Corp.

**Unit Heaters**
D. J. Murray Mfg. Co.
J. O. Ross Engr. Corp.

**Vacuum Cleaners (Industrial)**
Ideal Commutator Dresser Co.

**Valve Specialties**
Duriron Co.
Eastwood-Nealley Corp.
Wm. Powell Co.

**Valves**
Carthage Machine Co.
Cochrane Corporation
Duriron Co.
Eastwood-Nealley Corp.
Hills-McCanna Co.
International Nickel Co.
D. J. Murray Mfg. Co.
Wm. Powell Co.
Trimbey Machine Works
Valley Iron Works Co.

**Valves (Elec. Operated)**
Brown Instrument Co.

**Valves (Gate)**
Wm. Powell Co.

**Valves (Non-return; Emergency Stop)**
Wm. Powell Co.

**Valves (Paper Stock)**
DeZurik Shower Co.
Eastwood-Nealley Corp.
Hills-McCanna Co.

**Valves (Relief)**
Wm. Powell Co.

**Vapor Absorption Systems**
J. O. Ross Eng. Corp.

**Ventilating Fans**
B. F. Perkins & Son, Inc.

**Ventilating Systems**
J. O. Ross Eng. Corp.

**Washers**
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
Moore & White Co.
Oliver United Filters Inc.

**Washers (Wood)**
Carthage Machine Co.
Downingtown Mfg. Co.

**Water Softeners**
Cochrane Corporation

**Water Wheels**
Holyoke Machine Co.
Springfield Boiler Co.

**Weight Governor**
Paper & Ind. App., Inc.

**Wet Machines**
Carthage Machine Co.
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
Smith & Winchester Co.
Valley Iron Works Co.

**White Water Samplers**
DeZurik Shower Co.

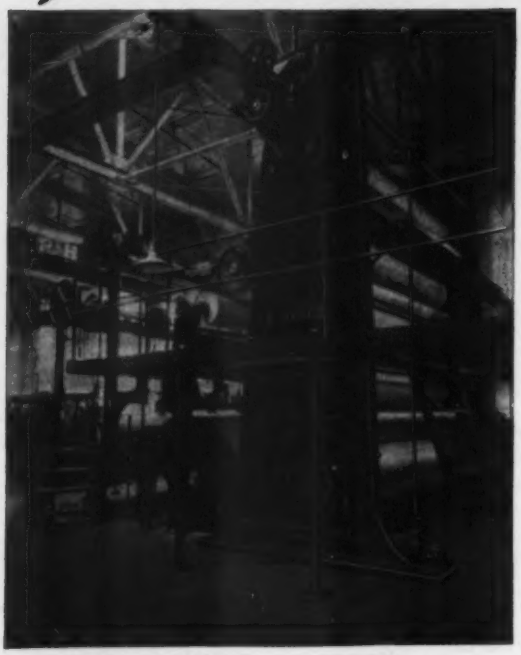
**Winders**
Beloit Iron Works
Cameron Machine Co.
Downingtown Mfg. Co.
Samuel M. Langston Co.
Moore & White Co.
Smith & Winchester Co.

**Wire Cloth (Nickel Alloy)**
International Nickel Co.

**Wires (Paper Machine)**
Appleton Wire Works
Eastwood-Nealley Corp.
Lindsay Wire Weaving Co.

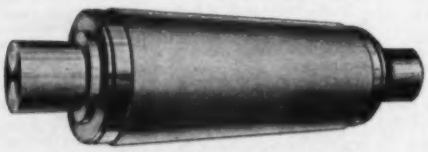
**Wood Grapples**
Link-Belt Company

# Textile's



# Calenders

**SUPER . . . FRICTION EMBOSSING**



*Over 70 years' experience in manufacturing cotton and paper rolls for the industry*

**ROLLS REFILLED AND REFACED REGARDLESS OF SIZE OR MAKE**

***Service and Quality that is outstanding***

*The Textile-Finishing Machinery Co*

New York Office
50 Church St.

Southern Office
Johnston Bldg., Charlotte, N. C.

*Providence, R. I.*

ORR FELTS
for Longer, Better and Most Economical Service
That is no sweeping platitude. It is true—absolutely true. Mills that have taken the slight trouble required to investigate can vouch for the accuracy of the statement—which mills, by the way, are today Orr users and Orr boosters. The Orr line is complete—contains the exact length, width and texture your particular machine must have.
An inquiry will bring an Orr Felt specialist qualified to suggest the particular felt that will remove the most water—AND DO IT FASTEST.
The ORR FELT and BLANKET COMPANY
PIQUA, OHIO

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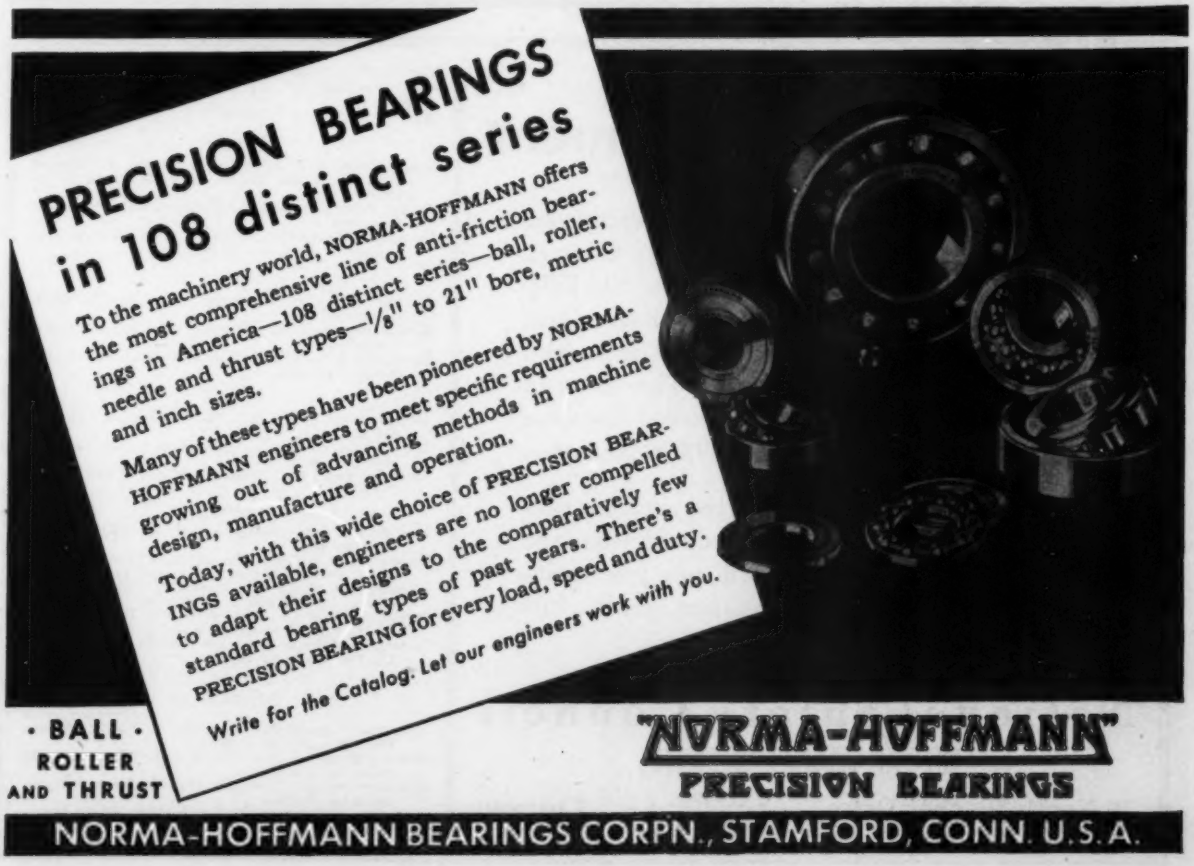
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in 108 distinct series
To the machinery world, NORMA-HOFFMANN offers the most comprehensive line of anti-friction bearings in America—108 distinct series—ball, roller, needle and thrust types—1/8" to 21" bore, metric and inch sizes.
Many of these types have been pioneered by NORMA-HOFFMANN engineers to meet specific requirements growing out of advancing methods in machine design, manufacture and operation.
Today, with this wide choice of PRECISION BEARINGS available, engineers are no longer compelled to adapt their designs to the comparatively few standard bearing types of past years. There's a PRECISION BEARING for every load, speed and duty.
Write for the Catalog. Let our engineers work with you.
· BALL · ROLLER AND THRUST
"NORMA-HOFFMANN"
PRECISION BEARINGS
NORMA-HOFFMANN BEARINGS CORPN., STAMFORD, CONN. U.S.A.

**A recent installation of Three TRIMBEY KNOTTERS in an eastern groundwood mill**

**KNOTTERS**
**PULP SCREENS**
**CONSISTENCY REGULATORS**
**METERING SYSTEMS**

**TRIMBEY MACHINE WORKS**
**GLENS FALLS, N. Y.**



# 16 per cent Improvement

The one hundred and ten mills which competed in the Paper and Pulp Section Safety Contest for the year July 1, 1934 to June 30, 1935 showed a 16 per cent improvement over last year. These mills employed 42,378 men who worked 86,867,184 man-hours. The average frequency rate was 16.566, a marked decrease from the average frequency of 19.626 last year.

▽ If you are not familiar with the accident prevention service that may be secured from the National Safety Council it will pay you to investigate. Complete information gladly furnished on request by the

**National Safety Council**
[INCORPORATED NOT FOR PROFIT BUT TO PREVENT ACCIDENTS]
**20 North Wacker Drive ⋱ ⋱ Chicago**

The following mills had the best records in their respective groups:

DIVISION I

*Group A*

Hollingsworth & Whitney Co., Algonquin & Taconnet Mill, Waterville, Maine, 2,449,530 hours, 11 injuries.
Bryant Paper Co., Kalamazoo, Mich., 1,491,538 hours, 9 injuries.
Canadian International Paper Co., Three Rivers, Quebec, 1,970,445 hours, 13 injuries.

*Group B*

St. Croix Paper Co., Woodland, Maine, 785,793 hours, no injuries.
Kimberly-Clark Corp., Niagara, Wis., 950,126 hours, 6 injuries.
Fraser Co., Ltd., Edmundston, N. B., Canada, 997,740 hours, 8 injuries.

*Group C*

International Paper Co., N. Tonawanda, N. Y., 548,504 hours, 1 injury.
The Crystal Tissue Co., Middletown, Ohio, 478,597 hours, 1 injury.
Escanaba Paper Co., Escanaba, Mich., 612,274 hours, 2 injuries.

*Group D*

Bird & Son, Inc., Phillipsdale, R. I., 216,581 hours, no injuries.
United States Envelope Co., Morgan Paper Co. Div., Lititz, Pa., 184,863 hours, no injuries.
International Paper Co., Livermore Mill, Chisholm, Maine, 158,610 hours, no injuries.
Spaulding Fibre Co., Inc., New Mill Plant, Milton, N. H., 125,879 hours, no injuries.
International Paper Co., Riley Mill, Riley, Maine, 116,298 hours, no injuries.

DIVISION II

Container Corporation of America, Natick, Mass., 166,846 hours, no injuries.
Texas Corrugated Box Co., Dallas, Texas, 141,340 hours, no injuries.
Southern Container Company, Houston, Texas, 129,016 hours, no injuries.
United States Gypsum Co., Genoa, Ohio, 82,084 hours, no injuries.